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The Eastern Arts Convention at Hartford, Conn.

THE Eastern Arts Association will hold its nineteenth annual meeting April 18th to 21st, at Hartford, Conn.

Mr. Theodore M. Dillway, president of the association, promises a program that is replete with interesting and instructive addresses.

The Art Section, Manual Arts and Vocational Section, and the Home Economics Section will have separate meetings on Thursday and Friday.

The American exhibit for the Sixth International Art Congress at Prague will be on display.

A copy of the tentative program will be found on page 153 of this issue.

(The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature.")

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THE INDUSTRIAL ARTS MAGAZINE

Volume XVII APRIL, 1928 No. 4

PROPOSED RECONSTRUCTION OF INDUSTRIAL-ARTS COURSES IN SECONDARY SCHOOLS

Wm. H. Mulvey, La Salle-Peru Township High School, La Salle, Ill.

Historical Sketch

INDUSTRIAL ARTS is the old form of manual arts made more broadly educational. It deals with the transformation of raw materials into a finished product, employing the necessary planning, designing, drawing, construction, and a great deal of related information to make all of the activities significant. The big thing to be accomplished is the development of ideals and abilities within the students, and this should always be first in importance, while the material products should be of only secondary interest.

The industrial-arts movement in the United States began with the Russian system of tool instruction, which was mainly on an exercise basis. Our industrial-arts work, even at its very beginning, was somewhat modified by the Swedish sloyd system. In their native lands both systems were essentially vocational, in the United States they became, and still are, pedagogical rather than vocational in nature. From the very start, two types of systems gradually developed: the general-shop idea in which the student gets experiences in different shop activities, without acquiring a high degree of skill in any one line; and the single-shop idea where the student gets sufficient experiences on a full equipment of tools, machines, and materials to prepare him to enter industry in a specific occupation upon the completion of his course.

While the movement still follows early forms of manual training, yet an attempt is being made to make the old types of work broadly educational. For this purpose, a great deal of related matter such as reading, planning, talks, pictures, and finished projects are being embodied in the work. The old type of training dealt almost wholly with the transformation of raw materials into a finished, and often a salable product, but offered little real information aside from manipulative processes. It was thought that this type of work would offer vocational or technical training through the handling of tools, and the acquiring of tool experiences. A change is taking place, however, because manual or industrial arts does not, and cannot train directly for a vocation. What, then, is the educational value of work of this kind?

Proposed Reconstruction

The home at one time was a self-supporting unit, having in it a very complete course of practical and industrial arts. Some of these were woodcutting, work in soils, fence building, cheese and buttermaking, basketmaking, toolmaking, carving, the care of domestic animals, etc. The child came into very close contact with these activities, and gradually learned all about them. Each and every one had its part in his development. Today these activities have left the home and there is no chance of getting those vital life-enriching activities of the past. There is but one place left where the boy can get them and that is in the school.

The prime purpose of an industrial-arts course in the junior high school for the student of 12 to 14 years, should be to offer enough of these activities to give him life experiences which will eventually lead him to prevocational and vocational training. In his contact with the various types of work, he may have found that he likes one of them or none of them, and in this way he is prevented from following an uncongenial line of work, because he has had these vital life contacts.

The industrial arts should give the student experiences, but it should also contribute to his general understanding of industry and industrial organization. A course in forge work, for instance, should have all of the manipulative activities, but it also should have much related material on iron mining, transportation of iron ore, blast furnaces, steel mills, steel-making, toolmaking, tempering, and other related processes. In the electrical course the related material should cover copper mining, smelting, wire making, and also something on rubber, where it is obtained, and the processes through which it must go before it can be used as a covering on electric wire. The glass industry would also come in for its share of attention because of the use of glass in the electrical trade.

One of the leading courses that might be used for this period of the boy's school life, is repairwork about the house. This course is commonly called "household mechanics" or "home mechanics" and includes building repair, painting, installation of electric wiring, electric lighting, heating, and many other courses, such as bookbinding, tool and knife sharpening, photography, printing, tinsmithing, forging, gas-engine work, autowork, wireless construction, furniture repair, shoe repair, woodwork, simple plumbing, and elementary mechanical drawing. All of these offer a rich field for experiences. They tend to train for handyman, and to a limited extent, give some prevocational training. Aside from giving technical training, the aim of the industrial arts might also be to enlarge the boy's viewpoint by not specializing in any one vocation, but by giving him a balanced understanding of several trades, or vocations, in order to enable him to get a rather broad view of the industrial world. This will enable the boy, who will finally settle down in some vocation, industrial or otherwise, to appreciate other occupations. He will have a better understanding of the problems of other workmen, and because of this, he will be a better citizen of the community.

An ideal shop for carrying on a large number of activities should be located in a room about 60 by 100 ft. This room should be well lighted, heated, and of factory construction. On each side of the room there should be four glassed-in rooms about 15 by 15 ft. in size, leaving a 30 by 70-ft. space in the middle for the larger shopwork. The glassed-in partitions need not be over 8 ft. high, with a large door opening

into the general shop. Each room should be equipped for its special work. For example, the one for electrical work should contain all of the tools and materials necessary to do good work in elementary electricity and radio work. It should possess also storage facilities for all tools and work. The other rooms should be equipped in a similar way.

The general space should contain several benches for woodwork, any necessary large machines, large auto-mechanics parts, a few drawing benches, and some lockers in which to store the boys' work. The instructor's desk should be placed at one end, facing the rest of the shop.

It might be well to assume that the woodworking tools, such as hand and power tools suitable for the making of simple articles of home and school furniture, playground apparatus, etc., tools for sharpening home cutlery and edge tools, a printing press and type, forge, anvil, and other equipment for repairwork would be necessary. There should also be a dark room with cameras, bookbinding materials, equipment for tinsmithing, sheet metal, and concrete work. If the community has a call for work of other types, equipment for this might be added.

This work should be required of each pupil in the seventh grade, because, although most boys of this age like this kind of work, there are always a few who are timid or backward who will not voluntarily choose shopwork. However, it may be made elective in the eighth and ninth grades. The shopwork should require two to ten hours per week. The work for the seventh grade must include as much as possible all of the play instinct of the boy. The following example will illustrate how this instinct may be utilized in developing projects:

Two boys, ages eleven and thirteen years, were interested in the making of a miniature threshing machine. They thought this would be an interesting thing, but didn't know how to start. They were directed to write to the J. I. Case Threshing Machine Company for literature on the subject. When it came, the boys were put to studying and planning. They then collected the materials needed, such as boxes, nails, an old wagon with wheels and other necessary articles. From their plans, they constructed an excellent machine, one that would thresh beans, separate them from the straw, putting the beans into a sack and the straw over an elevator on a stack. Then it was necessary to find some means of furnishing power. They mounted an old grindstone, and by using some old suspenders for a belt, they found it possible to run the machine very well. Still they thought the engineer had to work too hard and hence they started searching for some other means of power. In a secondhand store they found an old, burned out, 1-h.p. motor which cost them very little. They were shown how to rewind and rewire the motor. Printed directions and other literature on motors were studied while the wiring was progressing. It is hard to find two boys who work harder on any job than did those two boys on that toy threshing machine. There are few projects which cannot be worked out by using play as a background.

The work in this general shop should be organized on the project basis. Each pupil or group of pupils should be given opportunities to elect definite units of constructive work, each unit having an integral character, and each demanding appropriate standards of execution, and leading to a useful, practical project. If possible, the pupil should have access to several previously executed projects of a nature similar to that which he wished to make. To these concrete examples much printed and illustrated matter should be added, not merely of projects adapted to the pupil's capacity, but projects which are far beyond him, projects which man is using in his efforts to change and better the life of humanity. This printed matter, pictures, projects, and other things should be gathered and placed in the shop section where the activity to which they pertain is carried on.

There should be no definite arrangement of projects in serial form. Each pupil should have the approval of his instructor before undertaking a given project, and this should be given only if the project is within the pupil's ability. Each pupil starting a project would be required to complete it or be prohibited from starting another.

A set of working directions and suggestions from printed matter prepared by the instructor may be given to each one. Many boys are carrying out this same idea at home, working from printed directions and drawings, in making their own radio sets and other things. This plan can be and should be carried over into the school shop. There are many serviceable books already prepared along this line that can be used. After receiving directions, the boy should be able to carry on this work with very little guidance on the part of the instructor.

A large part of the educational value in such a shop comes from its perfect freedom, and the opportunities offered the pupil to observe tools and machines in use, projects in various stages of development, and pictures and literature on related industrial projects. The shop classes should in a large measure be self-governing so that the burden of maintaining discipline is placed on the student himself. There should be no resemblance of the old formal shop or schoolroom. What is desired is a shop which resembles the industrial shop as much as possible. Under reasonable restrictions each pupil should have full opportunity to observe processes other than those in which he himself might be engaged.

The boy should not be forced to take a large number of the activities, but after he has finished the seventh grade, he should be encouraged to devote most or all of his time, to the pursuit which he likes best, such as electrical, printing, or any other of the several shop courses offered. If he wishes to execute but one project in each section, he should be at liberty to do so. Until we have had more experience in this work, it is desirable to have as much elasticity as possible.

The instructor in such a shop must be able to gain and hold the confidence of every boy. He should, in fact, be somewhat of the type of a good first-class boy-scout master. He must be able to understand boys, and must himself be fairly well skilled in the several activities carried on in his shop. He should also have the ability of bringing in new material, of putting new life into the work, of broadening its viewpoints, and of giving his boys as many enriching experiences as possible. In boys of this age we find very strongly the spirit of investigation. The instructor should be able to keep this spirit alive, to direct it, so that continual healthy growth would take place.

This type of work offers an outlet for the juvenile activities formerly carried on in the home. It has flexibility, and does not encourage formalism. The type of work mentioned, can be made to fit the sixth, seventh, and eighth grades as they exist in most schools of the present educational systems. The work could then be carried further in the four-year high school.

In the Four-Year High School

In the first and second years of the regular four-year high school there should be a series of courses, extending over a period of from six to nine weeks, which would give the student a taste of the occupations as nearly as possible as he would find them represented in his community, and he should get his experiences in industry itself. This training, together with related reading material, lectures, and trips, would, in the course of two years, give the student an insight into eight or ten occupations, one of which might appeal to him. The training given in these first two years may be guidance, but it cannot lay claim to this until the student has found his place in industry. There is also the chance that the work in the school shop will be as useful to him as though it had actually trained him for entry into some industry, because it

may give him a useful avocation, which is also very necessary for his success in life. He will be able by this time to arrive at some conclusions of his own, and will, during his next two years, then be in a position to specialize further in the occupation he has chosen.

The last two years of the course will then be vocational in nature and should fit the student to enter directly into industry. Of course, this type of work could be carried on and justified only in a large school system where there are students enough to warrant the establishing of purely vocational courses.

The real objectives of the industrial-arts course are to assist the student in gaining:

(1) Health
(2) Command of fundamental processes
(3) Worthy home membership
(4) Vocation
(5) Citizenship
(6) Worthy use of leisure
(7) Character.

Of course, the amount of aid possible to give will vary with each objective, still there is a chance to aid somewhat in gaining all of them. Take the one on health. Habits of health can be inculcated and principles of good sanitation can be incorporated into almost every type of industrial-arts work. The principle of citizenship can be used in every course, by creating an interest in the welfare of the community. Character building should not be a separate course, but it should permeate every course.

In about twenty per cent of the cases, the work possesses both prevocational and vocational values, because some students will be inspired to go into a vocation, while others will be guided away from those for which they could never be fitted. Since the birthplace of all culture is found in a vocation and good craftsmanship, there are cultural values to be gained by the showing of good design, its history, and its effect on the different crafts; and it will also help in bringing about an appreciation for the things that are good and beautiful.

The work should offer appreciation of values. We are all consumers of goods, and we should teach the student to recognize values which lie within an article so that he will be able to decide between a medium and a superior product. Visits to factories, mills, and shops where the workmen and mechanics can be observed, and talks given by these men in the school shops, assist the student in getting the workman's viewpoint. Of course, this method of making shop visits, is by no means perfect, and makes careful planning necessary in order to make it valuable. Still the plan has merits and can be used until a better one has been devised.

These field trips must have a definite time and place in view. It should be known beforehand what the student is to observe and get out of them. The student's shopwork should be carried on in such a way that it is of the standard set by industry, whether it be in woodwork, drafting, metal work, printing, or any other branch. All of the manual work of the course should be performed intelligently and carefully. In order to round out the course, shop talks, writing of essays, studying of references, visiting of factories, studying of local construction operations, and the use of many shop textbooks should be woven into and through the course. None of these will alone suffice. In order to have a rich course, all of them must be used.

The subject matter should include such general topics relating to trades and industries as—the importance of the occupation under consideration, the condition of such employment, the opportunities for advancement, occupational diseases, health hazards, and sanitation. There should be information on related science, mathematics, materials, history, English, drawing and design, artistic effect, and the general care of tools and machines. Strong emphasis must be placed on subject matter.

The industrial-arts shop should be a place where all kinds of information, not only technical, but also cultural, is sought; where the conclusions reached from the tests can be verified with the conclusions reached by advanced thinkers in the field. Some mechanical skill should be acquired, but the main purpose is to make a constructive thinker.

The instructor in industrial-arts work for the student of 14 to 16 years, must have a good idea of industrial organization and industrial society. That is, he must understand the industries within the community where he works, know how they are organized, and what the standards of workmanship are for each. He must have an understanding and an appreciation of the other subjects in the curriculum which are outside of his own field. He should be able to apply some of this subject matter, when occasion demands, thus making the shop a vital part of the school curriculum in its relation to other subjects. Enthusiasm for his work, patience and sympathy, and the ability to gain the confidence and respect of his pupils and their parents, are prime requisites for a good teacher. He must have a pleasing personality, a good character, be tactful, and have ability to adapt himself on all occasions. A goodly portion of academic, shop, and professional training is desirable in the instructor. He must be able to bring in new material to enrich his courses and to keep alive within his students that human element of curiosity and the desire to investigate.

Some of the greatest values of shopwork often have but little vocational significance. There are certain contacts which each boy must sooner or later make with the material world. There are certain things he will meet aside from his business or trade, certain relations that he must assume. He will at times be called on to think in terms of proportions, tones, colors, decorative treatments, and many other things of a like nature within his home and the community at large. He will come into contact with men in other fields, and in order to be congenial he must be able to fit in. Thus it is one of the general tasks of industrial arts to make the appreciation of these things more complete. For this reason there must be injected into the work a great deal of the artistic. The artistic in this sense means that quality which can be built into a product which will give it a simple and pleasing appearance, no matter how utilitarian its use may be. This quality can be put into all products made of wood, metals, stone, leather, cloth, or paper, or of the combinations of any of these. By training and raising the taste of the consumer, the general level of manufactured products also will be raised. A knowledge of art in a product can give more pleasure than almost anything else in life. It can make both the producer and the consumer rich, give them a vision to be gained in no other way. A knowledge of art will reveal hidden beauty, and will also help in fusing the beautiful into the common things of life.

The industrial-arts shop in the four-year high school will differ somewhat from that of the junior high school. In the smaller communities the only practical plan is the one-room composite shop similar to the general shop of the junior high school, where five or six activities can be carried on. The nature of the activities will depend entirely upon the needs of the community. High schools in communities that have a population of from 15,000 to 50,000 need four rooms of sufficient size to carry on several different types of work. For example: In the woodworking shop would be found all forms of work relating to woodwork, both machine and hand, and fiber artwork. One shop would include all metal work, such as sheet metal, tinsmithing, auto mechanics, electrical, forging, and iron work, with the necessary metal-working tools and machines. The drafting room should be very closely related to all rooms. If printing were to be included, it should have a special room, and in connection with it, a photographic dark room might well be added.

The high-school industrial-arts shop should embody the advantages of both the diversified and the separate shops. Both types have their good points. In the separate shop there is the chance of better organization, much less confusion, better teaching, because the teacher is better fitted for the specialized work, less disciplinary problems, and less wasted time on the part of the student. Then, too, there is a better chance to make the courses offered have greater vocational values because of the chance to specialize. On the other hand, the diversified shop offers a better chance to try out the student's special interests, to make him observe others at work, to give him more freedom, and hence to arouse greater interest.

The high-school shops noted should, therefore, be so organized as to resemble one large diversified shop, the only difference being that the divisions of activities are more distinct. The major divisions can be more elaborate, have more equipment and offer greater chance for specialization than the small composite shop. There should be intershop travel under restriction, to allow for the completion of projects using more than one material. If deemed advisable, special arrangements can be made for the boy who wishes to take the minimum essentials of each type of work offered, or for the boy who desires intensive specialized work in one department. Each group of boys should have the opportunity to change their departments at the end of every nine to twelve weeks. There should, in general, be differentiation on the basis of individual needs according to varying economic conditions.

The following will illustrate in outline the type of work that can be done in one of the nine- to twelve-week periods. This course will take simple problems in electrical work to be carried on in the composite shop spoken of in the foregoing.

Problems:

1. Simple bell-circuit wiring.
2. Two buttons separately to ring one bell, and two buttons to ring three bells.
3. Three-wire return-bell system. Each button to ring but one bell.
4. Two-wire return-call system (using two batteries). Each button rings both bells.
5. Electric door opener and its doorbell system.
6. Constant-ringing bell or burglar-alarm system.
7. Three-station return-call system.
8. Annunciator return-call system.
9. Telegraph key and sounder hook-up. (Using first one and then both sets.)
10. Two-station pony relay telegraph hook-up. (Local batteries used.)
11. Simple hook-ups in radio for those interested.
12. Simple run of cleat-work wiring, with the use of two light receptacles.
13. Installation of snap switch and snap light with key socket.
14. Installation of a branch light from the main line.
15. Installation of a two-light stairway-lighting system (three-way switch).
16. Installation of three lights controlled individually by master switch.
17. Installation of knob and tube wiring for three wall-light sockets.
18. Installation of three ceiling lights and flush switch, using knobs and tubes.
19. Household emergency work and repairwork.
20. *a*) Construction of a bell-ringing transformer.
    b) Construction of a battery charger.
    c) Construction of a milkman announcer.
    d) There are many others that the boy may have in mind that can be worked out in this course.
21. Woven into and through the work should be assignments of reading on electrical inventions, types of electrical equipment and machinery, some simple electrical theory, safety instructions, material on electrical appliances for the home and decorative effects to be gained by proper use of electrical equipment.

In order to put this work into practice, it must be gone over very much in detail. Every intended course to be put into the shop should first be worked out in a general way and then worked out in detail in order to fit the condition under which it is to be given.

Since industrial arts is a true representation of life's experiences, it should have one of the important places in the curriculum in helping to develop and instill high ideals into the student. Much of the criticism of industrial-arts work is due to the fact that the work in the past has been too formal in its organization and methods of presentation. In schools where only one activity has been offered, an improvement can be made by using the project method, for even the very small shop can have a diversified type of work. The progressive instructor will ever be on the alert to see that new types of courses and materials are introduced to keep the work alive and interesting.

ASPECTS OF THE INDUSTRIAL-ARTS TEACHER'S JOB

G. A. Grant, Instructor, Industrial-Arts Education, Teachers' College, Columbia University

At a conference[1] held at Teachers' College, the matter of approximately what the industrial-arts teacher could be expected to include among his professional duties, and the matter of the type of curriculum in the teacher-preparatory institution through which he should learn to discharge these duties, was the basis of discussion. It appeared from the conference that both of these questions were considered of great importance. In order to look as objectively into some of the results of the conference as possible, a part of the material evolved as the basis for a professional curriculum has here been converted into a check list. The items in this check list were taken from the more complete curricular analysis built around the duties or responsibilities of the industrial-arts teacher in service. It includes those units in the upper three quartiles of all the curricular material. That is, assuming that all the units of curricular material have been ranked in order of the time allotment in terms of the median judgments of the conference members, those which constituted the top 75 per cent were included. The assumption in this procedure was this: The things which take a student a large amount of time to learn how to do, will be the ones upon which he should concentrate attention when he goes into the field to work. Of course, this assumption may not be entirely correct, but it is quite probable that it is *substantially* true, nevertheless. To the extent to which it *is* reliable, the check list of selected items shows what constitutes the biggest part of the industrial-arts teacher's job—the part upon which he might be expected to spend about three fourths of his time.

[1] A conference (April 25, 1927) under the leadership of Dr. F. G. Bonser to discuss questions relating to the professional curriculum for Junior High School Industrial-Arts teachers.

These major items are important, but before discussing what they represent, tribute must be paid to the sundry remaining activities, since they are not mentioned here, and because it is the difficulty of handling them that often bothers the teacher a great deal. For example, take the matter of professional correspondence. If the industrial-arts teacher keeps in touch with his community, his other direct sources of up-to-date information, his ex-pupils, then his letter writing becomes a real difficulty. The forward-looking principal or supervisor might well make some provision for supplying clerical assistance to meet this real need on the part of the industrial-arts teacher, especially, since so many of his contacts must be of an extra school nature.

Or consider the matter of teachers' meetings. Naturally, the industrial-arts teacher will attend them. But if he does spend his time in attendance he will also want an opportunity to work closely with other teachers. He will want to know and help to mold the policy of the school on important matters. He will want to have important educational issues discussed. He will wish his school to be progressive and will strive to make it so.

The industrial-arts teacher will welcome guidance of the right sort. There will be personal interviews with the supervisor and principal. Problems and difficulties will appear and a sympathetic yet critical analysis of his work will be necessary. The industrial-arts teacher will deserve encouragement. But criticism and encouragement should be of a kind that will increase both his efforts and his results.

These few instances suggest what has been omitted from our check list as of secondary significance. It is however, the more outstanding items that have been included that should deserve further comment.

Check List of Some of the Major Activities of the Junior-High-School Industrial-Arts Teacher

Time Distribution Given in Per Cent, 75

(A) *Making and Improving the Industrial-Arts Program*

1. Developing a working definition for industrial arts as a school offering.
2. Making a study of children's interests and needs as related to the industrial arts.
3. Developing an acceptable personal list of specific objectives as desirable outcomes for the industrial-arts program.
4. Developing general shop projects.
5. Making a survey to determine local needs, if any, for industrial arts for one's own school.
6. Analyzing possible and proposed pupil projects into specific pupil and teacher activities and responsibilities.
7. Preparing a daily, weekly, or monthly calendar of proposed, personal teaching activities.
8. Strengthening classroom instruction by studying desirable changes in present methods of teaching.
9. Organizing and recording classroom experiments in teaching and learning.
10. Getting clearly in mind specific methods of improving the existing industrial-arts program in one's own school system.
11. Participating in the preparation of analytical descriptions of manufacturing enterprises in the community for the use of pupils.

(B) *Putting the Industrial-Arts Program into Effect*

1. Helping pupils determine and classify desirable ideals, attitudes, knowledges, and skills as standards or objectives for their own work in industrial arts.
2. Studying with pupils the best methods of achieving different ideals, attitudes, knowledges, and skills, previously set up as objectives in industrial arts.
3. Explaining to children how different tools and pieces of industrial-arts equipment should and should not be used.
4. Helping pupils plan individual, group, class, school, and community enterprises involving industrial arts.
5. Teaching pupils to organize and follow a personal work program for enterprises involving industrial arts.
6. Holding conferences with individual pupils, and pupils in groups, for the purpose of discussing difficulties and offering guidance and assistance.
7. Studying with pupils the most efficient methods of discharging their responsibilities.
8. Teaching pupils to use the library.
9. Teaching pupils to use museums and other similar institutions.
10. Assisting pupils to plan and carry out excursions to local factories and shops.
11. Offering suggestions to facilitate the organization of pupils' school clubs.
12. Helping to plan children's club activities.

(C) *Selecting, Arranging, and Using Materials of Instruction in the Industrial-Arts Program (Equipment, Supplies, and Housing)*

1. Collecting, cataloging, and filing basic reference and illustrative material, devices and visual aids for instruction in the industrial-arts program (drawings, pictures, slides, moving-picture films, tool-operation manuals, catalogs, price and discount lists, etc.
2. Planning new types of equipment for use in connection with the industrial-arts program.
3. Preparing drawings and specifications of special equipment desired for the industrial-arts program.
4. Participating in setting standards and planning equipment layouts for the industrial-arts program.
5. Helping to plan and estimate the cost of more adequate housing for the industrial-arts program.
6. Making check lists and charts of technical skills involved in the use of industrial-arts equipment (machines, tools, etc.).
7. Developing, testing, and purchasing knowledges and skills for buildings; chemical products; clay, glass and stone products; clothing and textiles; foods; leather goods; metal products; paper, printing and bookbinding; plans and designs; vehicles for transportation; woods and wood products; and other miscellaneous manufactured products.
8. Developing knowledges and skills for the care and use of manufactured products. (See No. 7.)
9. Developing amateur producer knowledges and skills. (See No. 7.)
10. Securing vocational insights into manufacturing industries. (See No. 7.)
11. Obtaining vocational experience in manufacturing industries. (See No. 7.)
12. Developing skill in shop organization and management.
13. Making plans for the use of equipment by pupils.
14. Arranging existing equipment and supplies for most effective use by pupils.
15. Contributing material (completed projects, or descriptions of them) for a permanent educational exhibit to be used by pupils and other teachers in their work.

(D) *Evaluating the Results of the Industrial-Arts Program*

1. Collecting and filing available standardized or partly standardized examination and test material for use in measurement.
2. Building or helping to build objective examinations and tests for school use in industrial arts.
3. Analyzing reasons for pupil successes and failures.
4. Making studies of the effects of the industrial-arts program upon homes, community enterprises, etc.

(E) *Other Marginal Duties of the Industrial-Arts Teacher*

1. Developing personal interests in science, current social problems, philosophy and the like.
2. Developing personal interests in family, community, national and international affairs.
3. Developing personal aesthetic interests.
4. Developing personal appreciation of hand skills.

Roughly summarizing, the industrial-arts teacher, as this check list reveals his job, might be expected to budget three quarters of his available time in some such way as this:

Approximately one fourth of the time devoted to organizing and reorganizing the industrial-arts program as a whole and the various courses of study for typical groups and individuals: *the purposing-planning activities of the teacher.*

About one eighth of the time making those necessary arrangements and adjustments that will convert a paper program into an actual reality: *the socializing activities of the teacher.*

About one half of the time in getting the material of instruction arranged so as to make their use as profitable as possible for pupils: *the instructional activities of the teacher.*

Another one eighth of the time in evaluating the results accomplished and in performing other marginal duties: *the interpretive activities of the teacher.*

Of course, all these things will be done in varying sequences and amounts from time to time. Naturally, all the activities of the teacher will be centered around the various problems of the immediate situation confronting him. There can be no logically fixed routine or set of directions to follow. But taken over a considerable period, the net disposition of time might be somewhat as here suggested.

Referring now more closely to our check list, still more concrete impressions may be secured about the activities of the industrial-arts teacher. We might, however, first assume something about his working time. If a teacher conscientiously works forty hours a week, five days of eight hours each say, it is submitted that he has earned his salary. Now what will this investment of time produce?

Well, in connection with the development and reorganization of the industrial-arts program as a whole, he will have time to read and keep up with progress in the field at large. This will include a perusal of data from studies of children and contributions which tend to meet juvenile needs more effectively. This reading will tend to reflect itself in the work of the industrial-arts teacher, which will gradually change to meet the needs of the times and the particular school of which he is a part. An hour or so a week thus spent in keeping in touch with the significant trends of curricular development and the expansion of the industrial-arts field in particular, will be time well spent.

Then, too, the industrial-arts teacher will devote some of his time to planning his own work schedule. Devising an outline of the week's probable activities and preparing materials in anticipation of various pupil problems and enterprises, will take another three or four hours of his time. This outline, arranged to accommodate subsequent changes, will constitute a most valuable record of professional procedures.

Here it might be remarked that to develop a good teaching technic in terms of all the activities of our check list, experimental methods will have to be employed. Only in this way, is it possible to determine what methods are more or less effective than others. But the community, and parents, and others must be prepared for various modifications in industrial-arts work. This will call for frank and ingenious publicity of the right kind. The good teacher will not wish to move so rapidly as to outrun his constituents or his colleagues.

In thus keeping in touch with his community, the industrial-arts teacher might, in a semester of twenty weeks, expect to spend at least one full day getting out occupational data or assisting in its organization. This is not many hours, to be sure, but given the same willingness among a *group* of teachers much could be accomplished in any school system. Of course, in any work of this kind, considering the time limitations, the greatest effort would be made to organize and exploit existing sources of information. Personnel, welfare, or even advertising departments of various local firms, civic bureaus, and similar organizations, together with government agencies, should constantly be consulted. The amount of reference material of this kind is truly enormous and it is something of a pity that its extent is not more clearly realized.

In view of the fact that actual factory visits are of varying significance to different pupils, and considering, besides, the relatively small amount of time our check list devotes to accomplishing these, it would seem best to have boys and girls in rather small groups provided with transportation facilities and responsible factory guides. This would make the teacher primarily responsible for establishing contacts and arranging for pupils to follow these up as closely as possible in terms of their individual needs. Only in this way is it possible to cover a large amount of territory with appropriate intensiveness.

Of course, the industrial-arts teacher will do a good deal toward helping his pupils use all the important library facilities. The boys and girls should be familiarized with the authentic and staple sources of data that they need in enterprises involving a knowledge of industrial-arts products and processes. Museums and similar institutions included should be visited. All such repositories of material are quite as significant, in most instances, as any of the resources that the school houses within its own walls. The good industrial-arts program will not fail to establish the closest connections with such important auxiliary agencies.

In connection with putting the industrial-arts program into effect, the pupil-teacher relationships continually place emphasis upon the formulation of purposes. This eliminates the older types of teacher-controlled procedure, which was characterized either by a common project carried out through dictated directions or by the assigned use of various types of job sheets. The attitude of the teacher should result in placing, as much as possible, the responsibility for achievement upon the pupils. His function should be largely to stimulate or to help pupils over the biggest difficulties—difficulties about which they naturally feel justified in coming to him for assistance. As Henry Van Dyke says of the good teacher: "He awakens sleeping spirits. He quickens the indolent, encourages the eager, and steadies the unstable. He communicates his own joy in learning and shares with boys and girls the best treasures of his mind." But, after all, it is just as much the pupil's job to decide what he needs from school and to set about getting his needs satisfied as it is for the teacher, or the school, to provide a naturally rich and enticing environment. In the same connection it should be noted that pupils' club activities, so rich in personality-development possibilities, are to occupy at least an hour of the industrial-arts teacher's time. His influence will tend to eliminate undesirable social characteristics of small cliques as well as inconsequential juvenile busy-work. Positively, he can make these club activities a very useful agency by which to break down the traditional sex barriers separating boys and girls; barriers which make it impossible at present, for the latter to get very much, in most junior high schools, from problems which involve industrial-arts content. There is no very good reason why girls should not have an opportunity to develop creative abilities through manual or tool-operation experiences in the industrial-arts shop or laboratory. Certainly, they should find the home-mechanics phase of industrial arts useful. Above all, girls have as much reason to be interested in the study of occupational conditions from the vocational or from the more general social-science viewpoint (a study that might well develop out of some manipulative experience) as have the boys.[2] This is an important fact although one which is very commonly overlooked.

Referring again to our check list, and recapitulating to some extent, we find that the largest amount of the industrial-arts teacher's time (25 per cent) is to be spent continuing to develop what might be called technical knowledges and skills which he needs to help his pupils; knowledges and skills involved in the testing, selecting, use, care and repair of industrial products; knowledges and skills involved in amateur production for nonvocational (avocational and other) ends; and knowledges and skills involved in the study of manufacturing and mechanical processes and the personnel factors that make them possible. This considerable amount of emphasis may well be placed here. No teacher can acquire a sufficiently extensive background of experience in regard to these matters, for a large field, in two, three or even four years at a normal school. Besides, conditions change so much that a good professional foundation is required to establish a set of varied habits and methods of work that will make it imperative for the teacher to grow when he goes into the field.

The industrial-arts teacher *must continue* to develop further knowledges and skills. He will be adequately motivated in this by the appearance of problems among the pupils with whom he works. For these problems he will have

[2]At the present time (Fourteenth Census of the United States, 1920) twenty-two per cent of all women gainfully employed are engaged in manufacturing and mechanical industries; for them, this category is the second largest of all, contains only three per cent less than the biggest grouping, that of "domestic and personal service," which comprises one fourth of all women economically occupied—using this term to exclude homemakers, as such. It is also significant that between 1910 and 1920 the proportion of women in industry has slightly increased (one tenth of one per cent), whereas for "domestic and personal service" it has decreased almost six per cent.

no ready-made solution. But he *should* be able to suggest how a solution could be obtained; in fact, he might well participate in some of the activities which are to provide a solution or an approach to it.

For example, take the case of a group of pupils experimenting with the now relatively simplified aspects of color photography. This experimentation might lead to a desire to develop a means of converting some of the photographic transparencies obtained into small leaded glass window decorations following the spirit of earlier craftsmen but incorporating modern technics. Of course, this situation may not appear altogether authentic to some industrial-arts teachers. Disregarding its authenticity, if necessary, it can still be said that we have a problem which might be typical and *which should make the teacher as eager for information as his pupils.* The chances are remote that, in this particular instance, he would know exactly how the enterprise could be carried out. *But he should know many sources of information which, linked together and utilized, would lead to the successful conclusion of the enterprise and the subsequent development of others equally challenging.*

As to the type of tools and machines the industrial-arts teacher will need in order to make his expenditure of time on the knowledge-skill phase of his own and his pupils' work as profitable as he might desire, the twelve divisions mentioned in item 7 of section B of the check list (and applying to the four subsequent items) might be regarded as suggesting the necessary equipment for the industrial-arts field. The actual grouping or naming of these divisions is of no great consequence, especially since the equipment they suggest will be as simple as possible. This equipment may also be distributed in various places throughout the school, although, principally, no doubt in one large general laboratory easy of access and, therefore, very likely on the grade level. But the industrial-arts teacher, regardless of what names his laboratories bear, should see that, taken together, they actually provide the facilities through the use of which he can accomplish his full program. Obviously this will call for the closest cooperation with other teachers where this program might otherwise overlap or duplicate their several fields. More definitely, it might be concluded from the nature of the industrial-arts program, that this cooperation would provide an especially close tie-up with fine arts, drawing and design, general science, home economics, language study, mathematics and social science.

Referring again to our check list, it will be seen that the collection or preparation and use of examination and test materials appears to absorb about four per cent of the industrial-arts teacher's time. Since this will amount to very little more than thirty hours per semester, there will obviously be the necessity for expecting pupils to be as critical as possible of their own and their fellows' efforts, in terms, of course, of their juvenile standards of purpose. The chances are that the development of this critical attitude will have very potent effects. This would seem to be especially true in view of the source and timeliness of critical comments. The more formal tests, even new-type examinations, in a program that is considerably individualized, would do little more than supplement direct criticism, informally and naturally given at the psychological moment.

Finally, the industrial-arts teacher should appropriate a certain amount of time for what have been listed as marginal duties or responsibilities. These duties should have for their purpose the integration of the whole gamut of professional activities with a more complete and systematic philosophy of life.

That too few of us as industrial-arts teachers make sufficient effort to see our work from this rather detached vantage point, is one of the difficulties in the way of our obtaining a truly broad and humanistic conception of education. One of the real dangers from which our industrial-arts work has suffered seems to have been traceable to a very narrow view, which exaggerated the disciplinary rather than the functional value of the work. Actually, when interpreted in terms of the dynamics of life, the real contribution of the field of the industrial arts is seen to be very useful and direct indeed.

The larger responsibility of industrial-arts teachers, then, consists in getting a broad expansive outlook upon a most complex but after all comparatively small professional field. This purpose must be constantly before us in order that it may be achieved more and more fully.

COOPERATIVE FOUNDRY TRAINING

Floyd R. Love, Director of Vocational Education, Stockton, California

THE BEST WAY to measure the success of your vocational work is to ask yourself this question: What interest are the industries of my community showing in my program? If no appreciable interest is being shown, it is quite evident that somebody is falling down on the job.

You may not want to take the blame for this yourself, but just stop and take inventory of what you have done to stimulate this interest. Quite true, you have talked with the heads of your industries about it, but have you presented them with a definite plan for action and then kept after them to see that it was put through? If you have, I am sure you will have found them ready to cooperate in every way possible as soon as they saw that you meant business. If you have not done this, just try it out and see if my little philosophy is not true.

I talked several times with the head of our Western Harvester Company about apprenticeship training, but did not get to first base with him until I had a definite plan of action laid out. When he saw what I wanted to do and just what part his company was to play in the program, he was willing to talk business at once. It was less than a month after this plan was presented that the work was started. I do not want you to think that my plan was accepted and put into action without some modification. As soon as I had a teacher appointed to work in this plant, he and the men directly concerned with the program reconstructed it to fit the definite needs of the plant.

If you have not started any of this cooperative work, let me give you a tip, be careful about whom you put into a plant as a teacher. The success of the course will depend almost entirely upon him. I happened to be fortunate enough to have a man in my department who had worked in the harvester plant for ten years. He was well liked and when I said Mr. J. M. Bond was to be the apprenticeship director, all the foremen were well pleased and told me that I could not have chosen a better man.

To start with, this teacher worked in the plant from three o'clock until five, five days a week and all day Saturdays. He consulted all the people concerned and a training program was organized before a boy was placed in the plant.

When boys were needed, the placement secretary of the part-time school interviewed a group of them and they were sent over to the plant. At the plant they were again interviewed by the director of apprentices and the superintendent of the foundry and were all given a rating. The minimum educational requirement was graduation from the eighth grade.

BOYS WORKING ON A MOLDING MACHINE.

If a boy had training beyond this and was physically fit, he was given preference over the eighth-grade graduate. The company wanted some boys who could be trained for foremanship work and other positions of responsibility throughout the plant.

Boys are taken into this department a few at a time and as soon as they have sufficient training to be moved on a few more boys are taken in.

So far, the whole group of boys have shown exceptional ability and the director of apprentices is well pleased with them. The boys are appreciative of the attention shown them in their work and are making every effort to please all concerned.

The company was so well pleased with the program that they decided to extend this training throughout the plant. When this was decided, the school gave them the full-time

MOLDS BOYS HAVE MADE ON MACHINE.

service of the apprentice director. He works in the plant eight hours a day and eleven months in the year.

The training has now been expanded to take in apprentices in the machine shop, drafting room, and millright department. In the very near future the sheet-metal and pattern shops expect to take on a few boys.

This plan of training is closely tied up with the Stockton High School. The foremen, who give the boys their shop training, are all highly skilled in their work and have been granted special secondary-vocational-arts type credentials for teaching foundry practice. The related work is given by an experienced high-school teacher, and the attendance of the apprentices is reported to the attendance clerk at the high school.

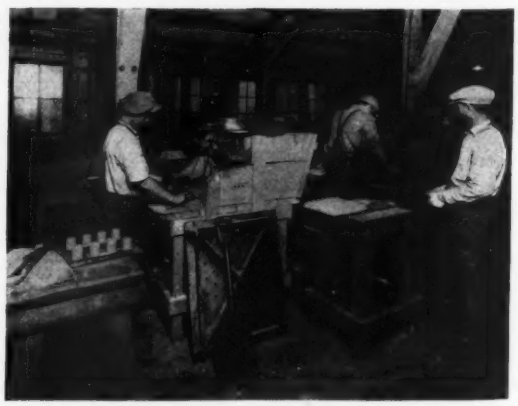
The course covers approximately a four-year period, and when successfully completed all the apprentices receive a diploma of apprenticeship signed by a representative of the Western Harvester Company and the Stockton Board of Education. The boys are paid for all time put in, whether it is in the shop or in the classroom. For overtime they get time and a half. The majority of the training takes place in the foundry where the boys work on production.

Nothing is done merely for practice. Everything worked on by the apprentices is intended for use. The training takes place in the shop under shop conditions and when the boys have finished their course, they will not only be skilled foundrymen, but will also be accustomed to shop conditions.

The shop program was arranged after a careful analysis of what abilities and skills are required by an all-round foundryman, had been made. The foundry superintendent, the foreman, and the director of apprentices worked together in making this analysis. To provide for flexibility, the shop outline is divided up into a series of units, to each of which is allotted a given period of time.

The units do not necessarily come in the order shown, the only requirements being that the work of each unit be given progressively as regards difficulty and that each apprentice cover the allotted training in each unit. The shop training is divided up into three main parts: molding, core-room work, and miscellaneous work. The units of the molding group take 143 weeks. They are divided as follows: Light roll over jolt molding machine, 17 weeks; heavy roll over jolt molding machine, 9 weeks; squeezer molding machine, 13 weeks; bench molding, 26 weeks; light and heavy floor molding, 78 weeks. The core-room division requires 39 weeks as follows: Helping in core-room, 4 weeks; simple core work, 9 weeks; complicated core work, 13 weeks; assembling, passing and inspecting cores, both light and heavy, 13 weeks.

The training involved in the last or miscellaneous group of units comprises 26 weeks. Of this, cupola practice takes 9 weeks. Here they learn to patch up the cupola, and to lay the bottom, to weigh up a charge of coke and iron and put it into the cupola properly, and many other things involved in cupola practice. Nine weeks in the pattern shop also comes under this heading where it is expected that the apprentices will acquire a more wholesome respect for pattern equipment in general. Four weeks of inspecting castings will serve to more fully acquaint them with the numerous causes of defective castings, and 4 weeks in the office, which completes the shop program, serves to familiarize the apprentices with the office routine followed in ordinary castings and keeping the records of castings made.



BOYS AT WORK IN THE CORE ROOM.

The schoolwork is all done in the plant. They have fitted up a classroom that would be a credit to any public school. It is well lighted, heated, and ventilated, and has an abundance of floor space. The room is well situated, it is away from the noise of the shops and still close enough, so that the classes can be taken out into them during class periods for practical demonstrations.

The most of the related work is done in this classroom. In general it involves shop mathematics, science, English, history, civics, mechanical drawing, and blue-print reading, shop safety and hygiene. The mathematics involves a review of the fundamentals of arithmetic with special emphasis on mensuration. With this as a background, the apprentices are given the opportunity to estimate the weight of castings from blue prints and from the casting itself. Their estimates are checked by actual weights. It also involves the estimating of shrinkage and draft for patternwork. The boys are taught how to figure a mixture of iron to satisfy the requirements of particular types of castings, as well as how to mix and melt the various ingredients entering into a brass or bronze casting. They take actual cupola charging reports and estimate the melting loss, the percentage of good and bad castings, the melting ratio of coke to iron, the percentage of the melt returned as gates, spurs, shot iron and bottom drop. They are given experience with payroll problems, and with the fundamentals of cost, figuring the cost of melted iron at the spout, the cost of molding, the cost of the cores, and an understanding of the factors involved in factory overhead. The above are a few of the mathematical phases related to the foundry trade that are considered in this course.

The science covers a wide field. The boys are taught the relationship existing between the chemical elements in a casting, the percentage of loss or gain experienced by these elements during melting, the effect of the temperature of melted iron on the strength and quality of the castings, the core mixtures to be used for certain types of cores, the consideration to be given the shrinkage of cast iron as related to the design of a casting, the composition of molding and core sands, the principles involved in tempering and renewing molding sands, the principles involved in gating patterns, and the structure and physical and chemical properties of coke suitable for melting iron. The above represent a few of the phases entered into as a part of the science of the foundry trade.

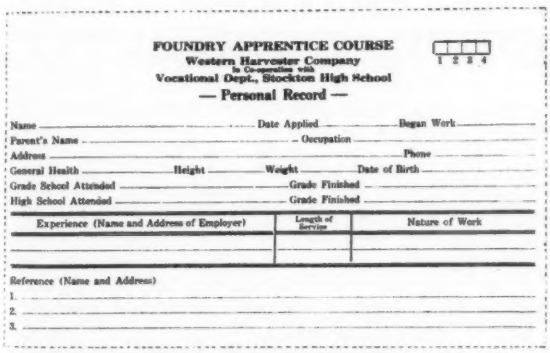
The drawing has to do largely with shop sketching. However, considerable stress is placed on the reading of blue prints, the ultimate objective of which is the ability to estimate the volume and weight of a casting from the print, and the interpretation of the print in terms of the patterns, determining the method of molding and gating and the core boxes that will be required to produce the casting.

The history content has to do very largely with the industrial history of America, the rise of quantity production, specialization, and standardization of product, and so forth. Under this heading also comes economic phases, such as marketing, banking systems, wage systems, taxation, etc. Also the history of metals, the story of metal working through the ages and the contribution of metals toward the development of the present civilization.

The civics content takes on the character of community civics. The system of police and fire protection is studied by means of trips through these city departments and talks by officers of these organizations. The city council meetings are attended and trips are made to the offices of the city and county tax collectors where the system of assessing and taxing property is seen. The system of voting is observed and practiced. The courts are visited while in the process of trying cases. Discretion must, of course, be exercised in choosing the court cases to which the students are taken. The effort is continually made in this part of the course to so train the boy that he will become a useful as well as an intelligent citizen.

English is taken up from the standpoint of comprehension of the written and spoken word, the ability to read trade literature and to write trade articles, to write convincing letters and to express intelligently their own ideas.

The study of safety and hygiene is promoted through the medium of a safety club on the part of the apprentices. They elect their own president, vice-president, secretary-treasurer,



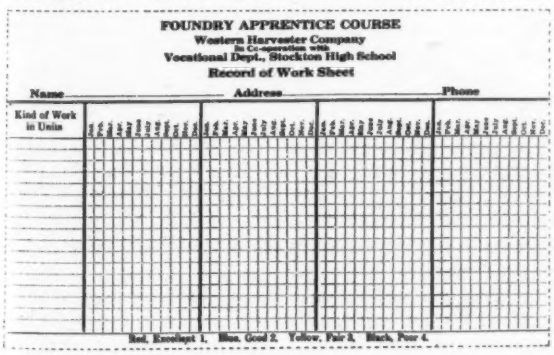
FOUNDRY APPRENTICE COURSE
Western Harvester Company
In Co-operation with
Vocational Dept., Stockton High School
— Personal Record —

1 2 3 4

Name ____ Date Applied ____ Began Work ____
Parent's Name ____ Occupation ____
Address ____ Phone ____
General Health ____ Height ____ Weight ____ Date of Birth ____
Grade School Attended ____ Grade Finished ____
High School Attended ____ Grade Finished ____

Experience (Name and Address of Employer)	Length of Service	Nature of Work

Reference (Name and Address)
1. ____
2. ____
3. ____



FOUNDRY APPRENTICE COURSE
Western Harvester Company
In Co-operation with
Vocational Dept., Stockton High School
Record of Work Sheet

Name ____ Address ____ Phone ____

Kind of Work in Units

Red, Excellent 1. Blue, Good 2. Yellow, Fair 3. Black, Poor 4.

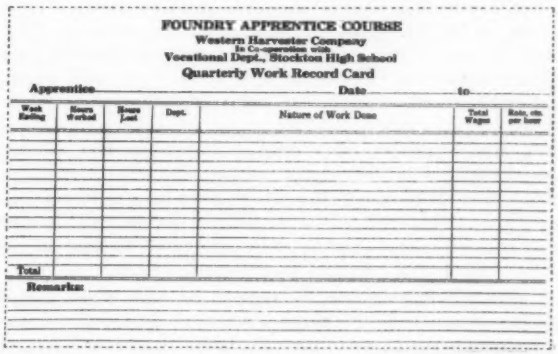
FOUNDRY APPRENTICE COURSE
Western Harvester Company
In Co-operation with
Vocational Dept., Stockton High School
Monthly Work Report

Apprentice ____ Month of ____
Nature of Work ____ Position ____

Characteristics	Exceptionally Good 90 - 100	Above Average 80 - 90	Average 70 - 79	Below Average 60 - 69	Exceptionally Poor Below 60
Interest in Work	Enthusiastic	Interested	Average	Indifferent	Not Interested
Application	Very Industrious	Industrious	Steady	Flighty	Lazy
Ability to Learn	Very Quick to Learn	Quick to Learn	Average	Slow to Learn	Dense
Confidence	Excellent	Good	Average	Poor	Timid
Accuracy	Exceptionally Accurate	Accurate	Average	Inaccurate	Careless
Speed	Very Rapid	Rapid	Average	Slow	Very Slow
Reliability	Entirely Dependable	Dependable	Satisfactory	Irregular	Unreliable
Initiative	Excellent	Good	Fair	Poor	Hopeless
Judgment	Exceptionally Good	Good Common Sense	Ordinary	Poor	Rash
Conduct	Exceptional	Good	Average	Poor	Troublesome

Remarks ____

Signed ____ Position ____ Dept. ____



FOUNDRY APPRENTICE COURSE
Western Harvester Company
In Co-operation with
Vocational Dept., Stockton High School
Quarterly Work Record Card

Apprentice ____ Date ____ to ____

Week Ending	Hours Worked	Hours Lost	Dept.	Nature of Work Done	Total Wages	Rate, etc. per hour
Total						

Remarks: ____

RECORD AND REPORT CARDS.

and safety committee. They study shop safety, and at the end of each month submit to the central safety committee of the plant, a report of suggestions affecting the working conditions of the factory. Matters of safety and hygiene are taken up each week at their club meetings which take place during the last half hour of the class period.

have any time off. The apprentices are made to feel that this room belongs to them. They can go there to confer with the apprentice supervisor, study, or play games for recreation.

The success of this whole program has been due to the fine spirit of cooperation shown by all concerned. The plant officials and foremen are all for it, and the Stockton Board

FOUNDRY APPRENTICE COURSE

WESTERN HARVESTER COMPANY

In cooperation with

Vocational Dept., Stockton High School

RECORD OF WORK CHART

NAME	FOUNDRY--33 months						CORE ROOM--9 mo.				MISC.--6 months			
	Light Rollover Jolt Machine 4 months	Heavy Rollover Jolt Machine 3 months	Squeezer 3 months	Bench 6 months	Light Floor 6 months	Heavy Floor 12 months	Helping 1 month	Simple Cores 2 months	Complex Cores 3 months	Pasting Light--Heavy 3 months	Cupola 2 months	Pattern Shop 2 months	Inspection 1 month	Office 1 month

WORK RECORD CHART.

The above is at best a very brief outline of the course of study for training of foundry apprentices. It is not considered as complete. The very nature of the work continually opens up new problems and opportunities and it is expected that the course will be continually revised to keep pace with the progress of industry.

The shop schoolroom possesses a technical library, which is open to the apprentices during noon hours or whenever they

of Education and superintendent of schools also heartily indorse this practical method of training boys.

May we see more public schools in the future joining hands with industry, in this common task of training our young men to be useful citizens by making them into efficient producers. The task is great, but the opportunities are abundant, so let's all get busy.

CORRELATING SUBJECT MATTER AND METHOD IN ARCHITECTURAL DRAWING

L. L. Stowell, Instructor of Architectural Drawing, North High School, Minneapolis, Minnesota

MUCH has been said about the kind and place of subject matter and method in academic education, especially how they apply to the lower and intermediate grades. It has been stated by such noted educators as Kirkpatrick and Courtis, that there is a very definite relationship between method and subject matter and that they are interdependent. "Subject matter should be selected on the basis of its interest and relationship to the everyday life of the pupils as well as the elements of knowledge we want them to obtain. Then, again, we must consider the ideals and attitudes to be developed by and through the subject matter and method used. It is essential that the method used in having a pupil acquire information and ideals be not only conducive to the pupils' whole-hearted interest, but that it be carefully planned and well thought out in every detail. Such a method will not arouse antagonistic feelings on the part of pupils to the learning process, because a maximum of pupil activity is assured."

This article concerns itself with a discussion of subject matter and method applied to architectural drawing in the senior high school, principally the A-tenth grade.

We will first consider the topic in the light of the subject matter to be used. Many educators within recent years are practically agreed as to what should be taught in academic subjects below the senior high school and how it should be done. Not so, however, in the case of industrial subjects. At present there is very little agreement as to what are the desirable things to be taught. This can be attributed partly to the fact that the number of people engaged in academic education greatly outnumber those teaching industrial work, and also to the fact that it is only within the last half century that industrial education has gathered much momentum, as a part of regular schoolwork.

The age of an institution and the number of people available to work on the product determines to a large extent the quantity of the output, and to some extent the quality.

Industrial education can point with pride to the beginnings it has made in the application of new methods; namely, scientific lettering scales and mechanical ability tests, etc., all developed within recent years. The next few years should see further progress along this and other lines. The closer that we can come to approximating what has already been done in academic education, the sooner our work will be conceded an equally important place in the curriculum by everyone concerned with education.

Owing to the fact that the subject matter presented in Figure 1 has not been scientifically determined, the reader must accept it with some reserve. This list of projects comprising problems one to twenty, has been used by the writer with

slight deviations through a period of three years. It has been tried out with pupils of various mental ages using different methods of presentation. Using progress graphs (see Fig. 2), and the grading scheme discussed more fully later on, the work of something like two hundred beginning pupils has been carefully checked for the last three years. The results that were obtained seem to indicate that the work is adapted to the tenth-grade pupil and to this school in particular. One of the best tests of any subject matter is the number of pupils failing in it over a trial period of time. During this period, four pupils failed and seven dropped the work, a total of five and a half per cent failed and dropped. The grades of the remainder of the pupils followed the normal distribution very closely. These same devices are now being used in an experiment to test the efficiency of various methods of teaching.

The aims of the course are: (I) Information. (II) Ideals.

The objectives to be realized are: (1) A knowledge of making drawings on various materials; (2) development of good habits of work and procedure; (3) an elementary knowledge of building construction; (4) acquaintance with the location, function and uses of building elements evidenced in everyday life contacts and observations; (5) formation of ideals and attitudes such as the attitude toward poorly designed architecture; (6) to cultivate a sense of proportion and a liking for the beautiful in architecture.

Outcomes to be attained are: (1) Worthy home membership, i.e., being able to recognize the type and location of repairs needed in the home; (2) spirit of cooperation, community service, willingness to assist someone else in planning remodeling work; (3) socializing the individual through cooperation with the group under conditions favorable to pupil initiative; (4) knowledge of the subject, possible trade or university preparation; (5) insights which will make him recognize architectural values in later life when he becomes a home owner; (6) ability to recognize artistic shapes from the nonartistic. Space prevents the listing of the many activities pupils may engage in to attain the outcomes, objectives and aims as set forth above.

Purpose and Use of the Pupils' Progress Chart

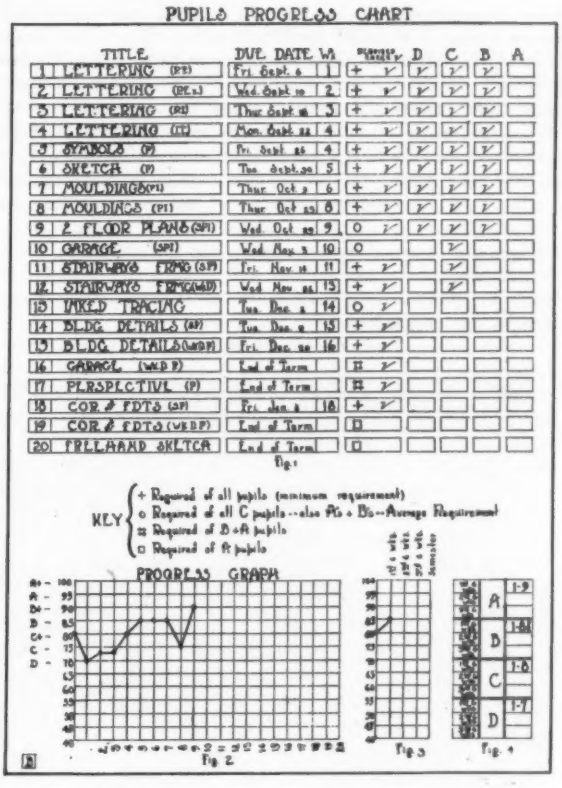
The twenty items (see Fig. 1), in the column headed *Title*, represent a brief outline of the projects as they are given to 10-A pupils, over a period of nineteen weeks averaging ten 45-minute periods per week. The abbreviations within the parenthesis after each problem are used to indicate the nature or character of the finished product, such as inking, inked tracing, etc. For the convenience of the reader the following explanation will serve to clarify the matter: P.T.= Penciled tracing; P.E.=Pencil exercise; P.I.=Penciled and inked; I.T.=Inked tracing; P.=Penciled only; S.P.I.= Sketch penciled and inked; S.P.=Sketch penciled; Wk. D.= Work drawing. The text used to supplement these problems is Windoes and Campbell, "Architectural Drawing." Several other books on architectural drawing are used for additional reference material; also newspaper clippings, articles in architectural drawing magazines and others, together with practical trade considerations. A saving of time is effected by following the advice of several architects, who suggested that a large amount of the time that is required of beginning pupils be devoted to sketching on cross-section paper.

Considerable variation is provided in the type of work required. The method of numerous short jobs with shorter intervals of time instead of longer problems with increased time allowances seems to be the most desirable from the pupils' standpoint.

A key or list of symbols which all pupils use in checking the plates they expect to complete during the term is shown immediately beneath Figure 1. Here is where purposing planning, self-appraisal and self-direction are much in evidence. Every pupil must decide the quantity grade he will try to attain. They must weigh their desires and their capabilities. The grade shown in the small square at the left of Figure 2, represents the grade which the pupil hopes to attain for his term's work.

The Course of Study

The course in architectural drawing is a flexible one; a C pupil is not required to do as large a quantity of work, nor work that is as different as a D pupil. This is one of the accepted findings of modern educational methods. Figure 4 shows that a D pupil must do plates 1 to 7 inclusive in the first six weeks. An A pupil is required to complete plates 1 to 9 inclusive during that time. All work in this class is on a socialized and individualized basis. Some of the aims of the course have already been mentioned earlier in this article. In addition, the pupil applies some of the educational principles advocated by Dr. Kirkpatrick; namely, self-direction,



self-appraisal, and self-control, or quoting from Mr. Courtis, "Method should provide for purpose, planning, executing, and judging, so that the pupil passes through these various stages in solving a problem."

A form of purposeful recitation, somewhat similar to the socialized recitation, developed by Mr. W. W. Hobbs, principal of North High School, Minneapolis, Minn., supplants the usual lecture method. Just before a problem is commenced the class is called together and their study directed into proper channels. The pupil is given the title of the next plate to be done, together with a list of subparts or problems which it includes; also the textbook references, scale of the problem, and other supplementary references bearing on the subject. Some of the most difficult points are anticipated and explained briefly. For example, the pupil is cautioned to study the plate of conventions and symbols in conjunction with the chapter on "Preliminary Planning" before attempting to work out a double-line sketch plan of a house. He is also told where the cutting plane must pass in order to obtain the desired view. Pupils who work faster than others, then read the assigned chapter, after which they ask any questions nec-

essary before proceeding with the work. Since slow pupils are generally several days or more behind schedule, the recitation is held several days after the directed study. When approximately 60 to 75 per cent of the pupils have completed the preceding drawing, a period of supervised study is required of all pupils. This will be the second reading for most of the pupils and the first for a few of them. Some of the brighter pupils assist the slower ones, at this time, in clearing up difficult points in the lesson. When this method is not used, the instructor passes among the pupils, assisting any pupil who needs help.

The next step in the lesson is the check on the preparation. Any pupil who has failed to complete the required reading, hands in the number of pages read on a slip of paper. Not very much is expected of this type of pupil during the recitation, but at the next recitation he knows that he must show improvement or his previous lack of preparation will count against him. The final step in this plan is the recitation. The instructor selects a question from those he has prepared on the subject and directs this question to some pupil, who stands and recites. After his recitation is completed, all pupils who have additions or corrections to make stand and wait for this pupil to give them a chance to recite on the same topic. It will be seen that by having the first pupil act as a chairman in charge of the question, that the responsibility is placed on the pupils, and not on the teacher. All questions proceed in the manner just explained. A recitation of this type occupies about forty minutes. Directing the study into proper channels takes, on the average, ten to fifteen minutes per assignment.

All dates in the column entitled "due dates" have been determined for this term's work by finding the average length of time required for a low C pupil to do each one of the plates listed. This average was obtained from time records of the various types of pupils over a period of three years. Slower pupils must put in extra time to obtain a passing grade.

The fourth column headed "Required Check," on Figure 1, shows two things: (1) All plates are checked according to the symbols given in the key previously referred to, and (2) the symbols following the name of each problem, represent the goal a B student is trying to attain. He must do all of the plates marked by plus, circle or number signs.

In the column marked C, the check marks represent completed work on the part of a C pupil up to Nov. 26, or for a period of thirteen weeks. He will also check with a check mark, any plate marked with a plus sign in the D column, also any plate marked with either a circle or a plus in the B column when completed, since it is possible that he may do either B or D quantity of work. These facts are clearly shown by the partly checked D and B columns. In a similar manner, any pupil can check the goal and the achievement. It is an easy matter to have a chart similar to this one drawn up on 9 by 12-in. drawing paper, by each pupil and all records kept by the pupil. If desired the class record may contain the names of the plates as column headings which will afford an accurate check on the pupils' recordkeeping.

Determining and Recording the Quantity Grade

Figure 4 shows the list of plates to be finished by various types of students for 3 six-week periods. The data for the second six-week period (not in the chart), is as follows: D= plates 7-10 inclusive; C= plates 7-11; C+ = plates 7-12; B= plates 7-12 inclusive, plus one half of 13; B+ = plates 7-13; A= plates 7-14. At the end of the six weeks each pupil plots his quantity grade as illustrated in Figure 3, which shows that a certain pupil made an average grade of 80 points last semester, and at the end of the first six weeks earned 85 points on quantity of work completed.

Use of the Progress Chart

Every pupil should know where he is and where he ought to be. These same criteria also apply to the quantity of work done. The numbers on the abscissa of this graph correspond to those in Figure 1. The curve shows that this pupil received an average last term of 80 points and on the first plate graded a mark of 70 points, etc. It also shows great variation in either the pupil's ability or in the arrangement of subject matter. Where grading in points is objectionable, the letter system may be applied just as effectively by omitting the numbers on the ordinate.

One of the principle advantages claimed for Figures 2 and 3 are that when they are accurately and carefully kept, a pupil may at any time compute his average grade for quality and quantity of his work without missing the true result by more than five points on either side of his average.

Suggestions and Additions

Before having pupils draw charts and graphs similar to the one shown in Figures 2 and 3, it will probably be necessary to explain the use and purpose of such a device. After the chart is drawn, read them the data you want included in the chart. This data should be written out on a piece of paper by the pupil before he attempts to letter it on the chart. There are always a few pupils who may not want to keep a record of their progress. This can be remedied by setting aside a checking-up period, for the instructor to check and assist the pupils in keeping their graphs up to date.

Determining the Quality Grade

The quality grade of a drawing is generally conceded to be the grade on any plate irrespective of the time required to do it or the pupil's attitude toward the subject. Various schemes for grading drawings have been worked out, each one a step in the right direction, but to date no scientific instrument has been perfected and made available for the use of the teacher of either architectural or mechanical drawing.

In view of the foregoing known facts, the rating system shown herewith, while not a scientifically devised instrument, will undoubtedly make an additional contribution to the already known mass of factors to be considered in grading a drawing. Nor is it merely subjective judgment. It represents the combined judgment of several individual teachers and persons familiar with architectural and mechanical drawing. The author has mailed a considerable number of copies of this scale to different teachers of mechanical and architectural drawing asking them to evaluate it.

Grading System for Drawings

1. General Appearance, 5 per cent.
   - A. Does the article drawn stand out?
   - B. Is the drawing centrally located?
   - C. Proportions.
   - D. Originality.
   - E. Design.
2. Lettering, 20 per cent.
   - A. Poor, 1-5 per cent. Extreme variation in thickness of lines, etc.
   - B. Pass, 6-10 per cent. Nonuniform heights, slants, lines, etc.
   - C. Medium, 11-15 per cent. Heights, slants, lines, generally uniform.
   - D. General O. K., 16-20 per cent. Little variation in heights, slants, etc.
3. Technical Correctness, 25 per cent.
   - A. Can the article be built? (BT). Are there any impossibilities?
   - B. Checking of lines, dimensions (CK).
   - C. Calculations (Math.). (M) Radiation, stairs, fireplace, etc.
   - D. Accuracy (ACC). Ceiling, wall thickness, planning, etc.
   - E. Representation of materials (RM), finished lumber, etc.
   - F. Knowledge of work shown (K). Individuality, knowledge of construction.
   - G. Omissions (OM). Items not shown which should be there.
   - H. Incorrectness not mentioned (INM).
   - I. Size of sheet (SS). Are all sheets same size?
   - J. Dimensions (Dim). Are dimensions well placed?
4. Technic, 40 per cent.
   - A. Workmanship (W). Is careful work and thought shown?
   - B. Neatness (N). Is work neatly done?
   - C. Weight of lines, proportions (WL). Are they standard?
   - D. Arrowheads (AR). Should be close in to lines.
   - E. Name plate (NP). Carefully worked out.
   - F. Blots (B). Patches of ink left on drawing.
   - G. Erasures (ES). Shows blots erased.
   - H. Cleanliness (C). Free from dirt.

I. Free-hand lines (FL). Are they carefully drawn?
J. Free-hand arcs (FA). Are they nearly like compass arcs?

5. Effort, 10 per cent.
A. Does he try to do the work?
B. Attempt for improvement in work.

Application and Use of the Rating System

This rating system has been used with slight changes in its composition for a period of over three years and applied to something like two thousand drawings. It has been used principally in two ways: (1) Letting the pupils grade their own work or their neighbors', which is good pupil activity, according to modern education procedure; (2) use of this instrument by the instructor for all penciled and inked drawings, except sketches and renderings.

To use every one of the subheadings given with its corresponding abbreviated corrections in grading each drawing is a complicated process which would seem to be justified only in special cases and in drawing examinations. The greatest use of the subheadings lies in their constant reoccurrence to the instructor's mind, when engaged in correcting a drawing. The result is a more accurate determination of the value of each one of the major divisions applied to any plate by placing the total of each one of the five major divisions of the drawing as per method indicated below. Considerable time and effort can be conserved and still obtain a total score much more reliable than any single grade based upon a fewer number of factors.

The data given in Figures 5 and 6, show the arrangement of the number of major divisions, score for each division, and total score for the quality of a drawing, expressed in points and letters as it would be placed on the corrected drawing.

All work handed in late is subject to a deduction from its total score or face value equal to two per cent per double period. In this manner speed is given its proper place in the grading of the work.

Using Figures	Using Letters
1 — 4	1 — C+
2 — 15	2 — C Proportioning
3 — 20	3 — C each part
4 — 32	4 — B
5 — 40	5 — A
Total.....81 = C+	81 = C+
Fig. 5.	Fig. 6.

Grading System for Six Weeks

1. Attitude, 20 per cent.
2. Recitations, 10 per cent.
3. Notebooks, 10 per cent.
4. Examinations, 10 per cent.
5. Quality, 25 per cent.
6. Quantity, 25 per cent.

FIG. 7.

The Six-Weeks' Grade

Figure 7 shows a rating scheme for six weeks, or any other interval of time desired, exclusive of the semester. It is evident that there are only two items included therein, for which the pupil cannot determine his approximate grade. Those items are numbers one and two. It is safe to say, however, that a pupil will have a fairly good idea of his score on those items based upon the general trend of affairs.

Conclusion

The writer has attempted to show how and where it may be possible for some of the new methods in academic education to be applied just as efficiently to industrial education. If any helping contributions to this end have been supplied, the purpose of this article has been attained.

THE OUTPUT OF ONE HEAT. OREGON AGRICULTURAL COLLEGE.

INDUSTRIAL-ARTS MAGAZINE

EDITORS

E. J. Lake *J. J. Metz* *S. J. Vaughn*

DEMONSTRATIONS

The demonstration as a teaching method possesses great merit. Not all demonstrations are meritorious, however. To demonstrate means to show, to point out, to exhibit by way of example. If all of this is done, then the demonstration is worth while; if any of these factors are omitted, the demonstration is a waste of time. Most students do not acquire knowledge by merely being shown.

In the course of a lecture, a prominent psychologist asked his auditors to watch what he did and then to imitate his actions exactly. He then placed his hand so that it covered the lower part of his face, or at least that is the way it seemed. He held the pose for about half a minute while his audience followed his example. Then he said, "I shall give you another chance. Now watch me closely and do exactly as I do." Again his hand was placed over the chin, and again the audience followed his example, or at least they tried to. With a rather disgusted air he said, "There is just one man who did what he was told to do. It is true, every one of you placed your hand over your chin, but only one man wiggled his ears." There was, of course, a roar of laughter, and then everyone *tried* to wiggle his or her aural appendages and succeeded with more or less, or rather, with less than more success.

His first demonstration was merely showing. Only one man out of over one hundred in that particular audience profited by the demonstration until the detail, which to the ordinary observer was not so apparent, was called to their attention. They had to be acquainted with every phase of what they were to do. Incidentally, this audience was composed of educated adults—teachers and other people who were more or less familiar with closer observation.

The average school demonstration is not so simple that there are only two factors for the student to acquire. Neither is the student able to make a rapid analysis of that which he sees unless he is given some aid. The teacher must bear this in mind, and in his demonstration point out the salient points in everything he does.

But even that is not enough. If the demonstrations of various teachers are observed, one quickly notes the varying effects these different teachers have on their students. The conclusion that the success of the demonstration depends upon the teacher is, of course, easily reached. But what makes the one teacher successful and the other not?

Each of two teachers has made thorough preparation, each has assembled all of the needed equipment and materials, and each is a master in his subject; yet one puts across a real demonstration, and the other succeeds only in a mediocre way. To what can this difference be ascribed? A little study will show that the success depends partly on the personal characteristics of the teacher, but mostly upon the enthusiasm which the teacher brings to his task. It is he who must sell his idea to his students. It is he who must arouse their energies with the superabundance of his own. When he once has stirred them into action, they must be carried along, and if the demonstration is to be successful, they must individually participate in one way or another throughout the entire demonstration.

WILL IT SELL?

What are the tests for a good design in furniture?

This question was asked in an examination on manual training for college-entrance credit and brought the following replies:

How will the public accept it?
What is the cost of manufacturing?
Will it meet competition?
Is the design for looks or comfort?
Will it sell?

The first and last of these replies are evidently based on the idea that popular choice is final and desirable. The second and third are based on the idea that cost of manufacture must be reduced to a minimum, to meet competition. The third is based on the idea that good furniture is designed for either looks or comfort and may not be designed for both.

Of course, the question was intended to bring out ideas of pleasing and effective design in appearance, and as such it failed miserably. The replies imply that beauty and usefulness are at variance, and that beauty has little or no commercial value.

To the contrary, modern business in furniture is based more upon a combination of beauty and usefulness than on other qualities.

Without a study of design, the manual arts become purely manual and mechanical and educationally useless.

Randall J. Condon, superintendent of schools, Cincinnati, and recent president of the superintendent's department of the National Education Association, insists that from kindergarten to university our teaching must be based on the following theory: "Art without industry is guilt; and industry without art is brutality."

HERO WORSHIP

In a recent article in *Vogue,* Deems Taylor makes the statement, "All men are created free and equal but may be trusted not to remain so." No adequate handicap has yet been devised for the race of life. There is some evidence that the faithful, steady worker does not win over the venturesome and spectacular individual under our present conditions of life in school or out of school.

The tendency toward hero worship is much in evidence both in school and out of school. Indeed! Hero worship has become the lazy pastime of many pupils in school and many citizens out of school.

We say "lazy pastime," because the form of worship is such that it serves as entertainment rather than as inspiration. Each community, each school, and each increasing group of citizens and pupils is satisfied to find a hero who represents it and on which it prides itself.

The sad feature of this blind hero worship is that it leads the ordinary individual to pride himself in the accomplishment of others and it leads the ambitious individual to a venturesome, sporadic attempt to get into the limelight.

How may the schools put a premium on good, faithful, and constant development of natural ability? That is our great problem.

ACTIVE MEMBERS WHO ACT

To the hard-headed business man, the high-school societies to which his children belong, are a necessary school evil to be tolerated. To teachers these same organizations are extracurricular activities, to be skillfully and effectively guided for their intrinsic educational values. When the business man comes in contact with the professional organization of teachers, he cannot understand why these same teachers who have so much experience in handling students' societies and associations, become so conservative and so lacking in initiative and

activity where their own professional interests and the interests of their cause are concerned.

The teacher who is constantly urging young people to take an interest in their school clubs and societies and is training them against errors in judgment is singularly apathetic and negligent about the operation of his own associations of professional equals. Frequently his membership activities are limited to the payment of his dues and more or less negative and languid attendance at a session or two of the annual conventions.

If elected to office the teacher will try a new idea in program making, sometimes—but tamper with the organization—no, that's a job for the next administration. And if the new administration does not make the break in the first ninety days of office, the problem is again left to the next administration for solution. This observation applies quite as much to organizations of shop teachers as it does to academic instructors. The associations composed of supervisors and teachers of vocational and industrial-arts subjects require at this time an active membership which is of advantage both to the profession and to the individual members.

It would seem that active memberships in the Eastern and Western Arts Associations and the American Vocational Association can be made *active* if they are made the basis of professional distinction. At present there are no tests for membership and no special credit accrues to the teacher who is earnest in his membership and contributed to the success of the organizations and the cause they represent. In architecture a membership in the American Institute of Architects is sought as a mark of professional standing; in medicine an election to the College (association) of Surgeons is a high mark of recognition by the profession; in law, admittance to the American Bar Association is sought and cherished by ambitious attorneys. Why should not the instructors engaged in industrial-arts and vocational education set the pace for the teaching profession by making active membership in their national and sectional associations a mark for professional recognition and reward?

For the associations themselves, recognition of active membership might well become a means of raising the organizations above the present uncertainty of financial support and continuity of service. An active membership which is of lasting value may be depended upon for a substantial initiation fee and for moderately good dues; it may be looked to for personal service in the preparation of programs and the carrying on of professional studies and the advancement of professional and association projects. With such backing it should not be difficult to get competent paid management of the associations and to build up the entire situation.

COOPERATION BETWEEN INDUSTRY AND SCHOOLS

The June "Education Bulletin" of the New Jersey Department of Public Instruction contains a paper entitled "Cooperation Between Industry and Schools," in which it attempts to show the changes in modern industrial plants, the creation of a better understanding of the inter-dependence of industry and education, and the results of a mutual responsibility in training young people for industry as revealed in numerous examples of cordial cooperation between the schools and industry.

One of the interesting examples of cooperative effort has been the apprentice-training program of the building trades. During the last five or six years the number of apprentices from these trades enrolled in the evening classes of the vocational schools of the state has increased from 100 to more than 3,200, and the number of employers and representatives of organized labor cooperating in the work has grown in corresponding ratio.

Cooperative effort between the groups has not been limited to advice and support, but materials, equipment, and financial assistance have also been contributed. For example, several trade organizations have paid the tuition of apprentices obliged to attend school in a district other than the one in which they live, and one organization gave half of its funds for the purchase of equipment for effective instruction.

The sense of responsibility that in the days of the guilds characterized both the employer and the apprentice have largely disappeared. The agreements which have been worked out in several districts between the employer and organized labor, the apprentice and the school, have served in some measure to restore this responsibility.

The city of Rahway offers an example of a district which has written such agreements in connection with the training of apprentices for the printing and carpentry trades. These agreements have nothing to do with wages or working conditions but are confined to the responsibility of the three parties concerned in training the apprentice.

Another example of cooperation between the schools and industry is the organization of technical clubs in connection with the Paterson Vocational School. These clubs are known under various names, meet regularly, and make use of the school shops as their laboratories. The economic results of the work of these clubs through the study of their trade problems cannot be measured, but they form an asset which will place the city in a most advantageous position to meet competition.

Another example of cooperation between industry and schools is in the Essex County Vocational Schools in connection with the jewelry and novelty industries. In these industries electroplating is an important process. The Essex County Vocational Schools in cooperation with a number of superintendents of electroplating plants, have organized a class for the study of modern practices in the deposition of metals. The manufacturing problems of many establishments have been simplified by the skill and knowledge acquired by the men who have attended the classes. Many of the other vocational schools have developed some special activity in this field and there is hardly a vocational school in the state which has not been concerned with the problem. The results of this cooperative work have no doubt contributed in no small measure to a clearer understanding between industry and education. This means better schools, happier and more efficient workers, and a clearer understanding of the problems in industry.

TIMES HAVE CHANGED

The old-time school teacher recalls doing a few chores about the house or a little shopping before or after the school bell called him to his work. In those days the stores opened at seven and closed anytime between six o'clock and midnight.

Professional men were on call almost anytime except while the chickens roosted, and doctors were always ready to hitch up and go miles to save a life. The mechanic worked ten hours each day.

And now? Well, it is different now.

The stores open and close with the schools. The doctors and lawyers and business men are out on the golf course or out to see the ball game on pleasant afternoons. The mechanic works eight hours for five days and four hours on Saturday.

The teacher must stay after school hours to make up class records, and he must take schoolwork home for correction in the evening.

Besides that, he must do summer work to keep up scholastically, or financially, or both.

We do not begrudge the doctor or lawyer or business man or mechanic their leisure time but we do insist that teaching is no longer a pastime for lazy folks, if it ever was.

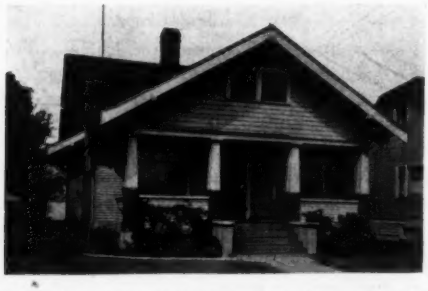
METHODS OF FINANCING BOY-BUILT HOUSES

Blanche Halbert, Washington, D. C.

THE ARCHITECTURAL BEAUTY and quality of construction of the next generation of houses, depends largely upon the training which is given to the boys of today, who are preparing themselves to be architects, contractors, builders and workers in the building trades. It depends, too, upon the education given to prospective home owners in house design and methods of construction, as this will influence the demand for better architecture and better building. The trade training in the schools of today will, undoubtedly, have the greatest influence on the beauty and comfort of the houses of tomorrow.

One of the most satisfactory methods used by vocational and trade schools for giving boys practical training in carpentry and house building, is the house-building project. "Better Homes in America," an educational institution which has been organized to assist communities in raising standards of housing and homemaking, has just completed a study of house-building projects carried on by boys of vocational and trade schools. This study was based on 106 houses representing the work of 40 schools. It includes information on the types of jobs the boys do, methods of estimating value of boys' labor, time required to build the house, types and costs of houses, methods of financing the project, values derived from the project method and opinions of vocational directors and carpentry instructors of the work, home-economics cottages as projects, and other allied subjects.

Since the greatest difficulty reported by school boards, vocational school directors, and carpentry instructors in carrying out the project of schoolboy-built houses is that of financing the project, this article deals solely with financing. Many schools which have been eager to carry on the project have reported their only obstacle to be that of raising the money to carry on the work. Prospective home owners are still skeptical of the quality of construction that boys are able to do and are not easily persuaded to provide building material and the building site for the school project. Many school boards are uncertain that the house can be disposed of after it is built, and are, therefore, unwilling to appropriate sufficient money to carry on this practice work. It is often difficult for teachers to convince school boards and communities that such projects can be successfully financed and carried out, and hence the project does not materialize. The boys of the building-trades classes who are always eager to create, and to carry on practical and useful work, clamor for the opportunity.



ONE OF THE NINE HOUSES ERECTED BY STUDENTS OF THE VOCATIONAL SCHOOL, EVERETT, WASH.

Quality of workmanship should not be considered an obstacle or reported as an excuse for not obtaining financial support for the building of project houses by schoolboys, as in the study of 106 such houses, only three were considered by carpentry instructors to be of poorer quality of construction than that of the average house of the community erected by adult labor. Other instructors and vocational teachers reported the boys' work to be on a par with, or superior to the average work of journeymen carpenters. Some carpentry instructors report construction work better, but some of the detail not so good. Other instructors believe boys excel, especially in house framing. One vocational director, where four houses have been built, reports the boy-built houses erected by his school to be better insulated against cold, the wiring to be more complete, and the houses to have better built-in features than most houses in the community. Many carpentry instructors reported their school-project work to be frequently inspected by contractors in the community, and in one instance where schoolboys built a practice house for home-economics girls and the cost of the house was estimated at $12,000, a large contracting firm of the city which had studied the house in the interest of a client, reported that the firm could not duplicate the house for less than $25,000.

INTERIOR OF HOUSE BUILT BY STUDENTS OF UNION HIGH SCHOOL, ROSEVILLE, CALIF.
House Financed by the Board of Education.

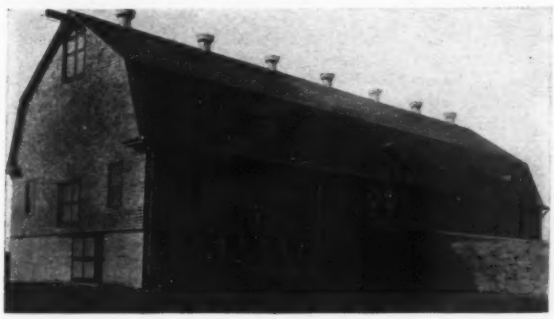
In the schoolwork on these project houses, more emphasis is placed on quality of work than on quantity of production. It is obvious that a longer period is necessary for students in training to erect a house than for journeymen workers, as learning to do is of far greater importance to schools than actually doing. At the Johnson School, Scranton, Pa., where an excellent house has been built for school use, the director states: "It was not our prime object to build a house, the building of a house at all times being secondary to the advancement of the trade-training of the boy. Our program is such that a boy has very fixed trade processes to accomplish each semester, and only when this building would advance his trade-training was he active in that work. Otherwise he was engaged in the shop or elsewhere on a particular job that would provide the necessary experience." Since most houses already built by schoolboys compare favorably with houses

built by trained workers, and since these houses are as attractive and as well or better built than most houses, quality of workmanship should not be considered by school boards to be an obstacle in financing.

A number of methods of financing houses erected by school carpentry classes have been used. The two most common are the home-owner or builder method and the school-board method. Seventy-five of the 106 houses included in the study were financed by a home owner or builder. In this method of financing, the school contracts with a prospective home owner who furnishes building materials and the building site. Jobs not done by schoolboys are sublet either by the school or the owner. Where the board of education finances the project, the house is either disposed of upon completion—sometimes by auction—or maintained by the school for some particular school use.

In Connecticut where a great many excellent houses have been built by student labor, and where each state trade school offering building-trades courses in its curriculum is expected to erect two houses a year, a most satisfactory method of financing is in use. Here, the school acts as the contractor and submits a bid for the house along with other outside bids. Although students are not paid for their labor, the school, in bidding on the house, estimates the cost of the house on a journeyman-labor-cost basis. The only difference in price is a small difference due to the greater length of time it takes students to build the house, thus necessitating a longer investment of money. The work which is not done by the boys is sometimes contracted for and paid for by the owner; in other instances the schools themselves sublet these contracts. The Connecticut method prevents any tendency toward the exploitation of students in obtaining labor free.

The house-building work of the Connecticut trade schools is excellent both in house design and quality of workmanship.



BARN BUILT BY STUDENTS OF THE HAMPTON INSTITUTE TRADE SCHOOL, HAMPTON, VA.

It is outstanding both in the project and in the extent of the project. The trade school at Bridgeport erected ten houses in 1926. Seven of them are single-family dwellings. At New Britain, Conn., twelve houses have been erected. The school at New Britain is one of the few schools where bricklaying is taught, and four of the twelve houses erected are of brick construction. In the Connecticut schools, classes in plumbing, electricity, painting and decorating, masonry and plastering, in addition to the carpentry classes, work on the project houses. As each trade school does not include all building-trades courses, there are always subcontracts to be let.

In reporting methods of financing through home builders and home owners, a number of schools have made special provisions for the prevention of exploitation of boys' labor. Most schools included in the study, do not include a labor cost in contracting for the house. Where this is not done, there is some opportunity for the owner to realize an additional labor profit if the house is put on the market. To prevent this, certain schools specify in the contract that the house is to be built for a home owner and may not be sold. The Stockton, Calif., high school uses a selective method of choosing applicants for houses. When the carpentry class is ready to build a house, a notice is placed in a local paper stating that applications may be filed at the school by prospective home owners. Persons desiring houses built then file their applications in which they must agree not to sell the house before five years except in cases of emergency. The applications are considered by a committee consisting of one member from the builders' exchange, one from the local carpenter's union, and one from the school. It is the object of the Stockton school, which has successfully built three houses, to build only for deserving home owners.

Twenty-four of the 106 houses studied were financed through school boards. By financing these project houses through boards of education, all opportunity for exploitation of student labor is, of course, eliminated. In a number of instances houses financed by the schools have been sold at auction upon completion—some at a profit of from 10 to 20 per cent. A number of schools have had home-economics cottages and practice houses built by boys of the building-trades classes; other schools have built teacherages and homes for faculty members in addition to school shops, portable school buildings, and additions to existing buildings.

At Hampton Institute, where over a hundred buildings have been erected, all of the project building is financed by the school. Many residences of stucco and of brick as well as of frame have been included in this trade school building program at Hampton. One of the most excellent projects of the institute is the school practice house which compares well in design and workmanship to any practice house in the country. The Hampton Trade School boys also do all the repairwork on the 145 buildings on the Institute grounds. This repairwork includes plumbing, repainting, and the repairing of heating plants, in addition to other repair.

In Roseville, Calif., where three houses have been erected by student labor which have been financed by the board of education, the houses are not sold, but rented to faculty members. The Chico Union High School at Chico, Calif., completed a five-room house in 1926. This was financed by the board of education, and is to be rented to some tenant. The Pana Township High School at Pana, Ill., built two houses since 1925. This school has an agreement with a local lumber company for the material and hardware necessary for the houses. Upon completion the school sells the houses and pays the lumber company. Any profit realized goes to the school for further project-building work. The Deerfield-Shields High School at Highland Park, Ill., erected a house in 1925 for which the school board appropriated $1,000. The balance was carried by the merchants of the city until the house was sold. Certain vocational teachers prefer the board-of-education method of financing student-built houses, because the method not only eliminates any chance for exploitation, but also makes the school board take more interest in the work carried on in the schools.

COLONIAL TYPE HOUSE BUILT BY STUDENTS OF THE TRADE SCHOOL, NEW BRITAIN, CONN.
This School Submits Bids, Including Labor Charges, for the Job.

In addition to methods of financing by home owners and builders and boards of education, various other methods have been successfully used. The house built by the Porterville Union High School at Porterville, Calif., in 1924, was financed by the Women's Improvement Club. The club furnished the material and the site and sold the house upon completion. In Weymouth, Mass., a house was financed by a local bank. In Peru, Ind., where a house was completed in 1926 by the boys of the high school for a Better Homes in America demonstration, the merchants and organizations of the city financed the project. The profits realized from the Peru house are to be given to the high school athletic association. At Collidersville, Tenn., a project house was financed by an interested citizen in the community together with additional solicited funds. At St. Helena Island, S. C., where the Penn Industrial and Agricultural School built a home-economics cottage, the house was financed by the Better-Homes committee.

For work on 93 of the 106 houses studied, boys received no pay for their labor, as most vocational directors and teachers agree that compensation for such work should be in the form of knowledge and training. The rate of pay received by boys in the remaining projects varied between 15 to 60 cents per hour. On one house, the boys' wages were estimated at 5 per cent of the cost of the material.

In order to correct the opinion of patrons of the schools and others regarding the quality of construction of houses built by schoolboys, it is essential to acquaint and interest communities with this type of project work. One of the methods that was used to arouse interest is a demonstration of such houses during *Better-Homes* week. Last year boy-built houses were demonstrated in Stockton, Calif., in Everett, Wash., where nine houses have been built; in Utica, N. Y., and in Peru, Ind. In each of these communities sincere community interest in the trade-school work was demonstrated, and many visitors attended.

Although difficulty in financing has been reported as the chief obstacle in carrying on a house-building project by boys training in the building trades, many methods of securing financial support for this project work have been successfully used. According to reports, both the home-owner method and board-of-education method may be made satisfactory. The home-owner method, however, is most commonly used throughout the country.

THE VALUE OF COMMUNITY VOCATIONAL SURVEYS

Walter R. Hepner, Superintendent of Fresno City Schools, Fresno, California

A HUNDRED AND FORTY years ago this September, after four months of stormy debate behind closed doors, the members of the convention that framed our Constitution were quitting the scene of their labors. An elderly woman approached Benjamin Franklin. "Dr. Franklin," she asked, "did we get a republic or a monarchy?" With characteristic caution Franklin replied, "A republic, if you can keep it."

Implied in this statement is the motivating idea of much of our modern educational procedure. We are shaping the various processes of education and testing them in terms of individual and social efficiency. We are comparing methods of instruction. We are evaluating the materials of our curricula. We tend increasingly to put our stamp of approval on those activities which give children the twofold power to adjust themselves to the conditions of living and to develop the will and ability to improve these conditions. In other words, we are thinking of our educational system in terms of keeping the republic.

At the core of our political structure is the occupational life of the people. Changing conditions have carried us far from the rather primitive domestic economy of our ancestors. The home is no longer a workshop. The apprentice system has, in large measure, become obsolete. The opportunities to get training on the job become fewer yearly. What we now call vocational education is a conscious attempt to meet the present need. Its central aim is to help children to derive the largest possible measure of success and happiness from their efforts to earn a living. It is one means of helping them to adjust themselves to the group life around them. Expenditures of school revenues for vocational education can be justified only if the school helps the child to make his adjustment more effectively than can be done alone through the home, the occupation, or some other community agency.

If we grant this premise, it follows that, as educators, we assume several responsibilities. First, it is necessary for us to develop some method of securing a continuous stream of information about the occupational needs both of the community and of the children. The second need is to organize and put into operation such modern procedures as will train children and place them in vocations suited to their capacities. Out of this need grows the third, namely, to devise machinery for a continuous check of the efficiency with which the program is carried on. The best method thus far developed for meeting these three conspicuous responsibilities is the community vocational survey.

Surveys are a Cooperative Undertaking

In its very nature this type of survey is a cooperative undertaking. For example, the Fresno survey initiated by Mr. Wm. John Cooper, then the superintendent of the Fresno city schools, at the instance of the state department of vocational education, illustrates the active cooperation of three educational agencies, the state department of education, the University of California, and a city-school system. The outside expert service provided without cost to the local system was received from Mr. Nicholas Ricciardi and his staff from the state department, and from Professor Edwin A. Lee and his staff from the University of California. Members of the general committee were appointed from these expert groups, from the chamber of commerce to represent the employers of the community, from the Fresno Labor Council to represent organized labor, and from the administrative and teaching staff of the public schools. There were special subcommittees of teachers and special lay committees representing the major vocational groups of Fresno. Capital, labor, and public education were thus united in the work of carrying on a cooperative enterprise of far-reaching value.

The interest and the willing contribution of time and energy by the representatives of the employer and employee groups in the survey activities, demonstrate the presence of a most valuable influence behind vocational education in the community. The employer recognizes the value of the improved abilities of members of his occupational group. Under these conditions the educators are able to draw the attention of both capital and labor to the problems of public education. At once these industrial groups recognize that the vocational courses are for distinctly practical purposes.

Then there arises a new interest in the procedures and problems not only of vocational education, but of the whole

school system. The survey becomes a most vital phase of the adult education program. It results not only in the enrichment of the educational facilities for youth, but also widens the horizons of interest and thinking of the men and women serving on the various committees. Teachers, employers, laborers, all gain a larger vision of the community's resources, as well as a stronger will to align these resources in the most effective way. This, then, is the first great value to be derived from a community vocational survey—closer cooperation between capital, labor, and the schools for the enrichment of the education of youth.

Another value of this type of survey is the accommodation of the school's program for trade and industrial education to the requirements of the child and of the community. Our need for clearer light here comes from the haphazard introduction of vocational courses into our schools. The long, full skirts of the elective system hide many queer pets. For example, administrator A, intrigued by the equipment and completed product in a mill cabinet shop viewed in one of his visits, returns to his system and takes the necessary steps to prepare a similar shop for those pupils who can be influenced to register. Probably by some such method much of our trade, business, and industrial training has found its way into our curricula. But if the function of education is to serve the community, then it follows that the vocational offerings should be in terms of the community vocational need. In an ideal situation, the supply of trained workers would equal or slightly exceed the demand in each trade or process for which the school should and is offering training. To determine the community's demand in various fields is the second major value of the community survey method.

A Survey Which was Started by the School

The survey in Fresno, initiated by educators, was directed in large measure by the teachers and administrative staff which is now carrying out its findings and recommendations. It was not a case of staff experts coming into the community and producing several weighty volumes of pronunciamentos on the status of vocational education. None of us wanted that kind of survey. Rather, we wanted to place upon ourselves the responsibility for the progress and success of the study of conditions in our community. Both the teachers and administrators found the contact with the outside experts very stimulating to clear thinking and sound practice. Our teachers knew that their findings and interpretations, their tentative recommendations and plans for procedures, would all be considered by these authorities. In their committees they discussed matters at first among themselves, and later with the representatives of capital and labor. Thus the teachers gained a sounder understanding of their task in hand and of its relation to the community at large. They saw in a clearer light the basic conditions of sound vocational training. The teachers have felt that the survey belonged to them. They made recommendations with the knowledge that they themselves would be made responsible for producing results. If this development of morale had been the only value achieved through the making of the survey, the whole undertaking could well be called a success.

Another value that results directly from the way in which the survey was made is the provision for the development of a course of study. Frequently a survey expresses itself in a new or modified course of study. Once it has been developed in a survey or otherwise, and the teachers have worked out the methods of teaching the various units, the course of study tends to congeal. In a few years it is likely to be out of date. Perhaps the outstanding characteristic of the Fresno Vocational Survey is that it was never completed! And we hope it never will be! Our committees have recorded certain preliminary findings and recommendations. But we have set up machinery designed to make the survey continuous and to reflect new findings immediately, into the course of study. According to the plan now in use the board of education officially appoints permanent advisory committees for each of the occupations for which the schools planned to give vocational training. On each committee there are two employers, two members of the trade union, the instructors in charge of the classes, and the local director of vocational education. It is the function of the committee of each occupation to keep fully informed on the status of employment and changes in operations and processes, and to develop the course of study in use in the schools. Under this arrangement the informational content, the skills and the methods used in the classroom and shop are kept continually in harmony with the most recent developments in industry. This steady stream of information is of incalculable value to the administrator. In the first place, he is sure of the validity of the facts upon which his teachers are making revisions or extensions of the course of study. In *general educational surveys,* on the other hand, after careful use of most of the tools of measurement thus far devised, we can make only a rough estimate, if any, of the degree to which the special needs of our pupils and our community have been met. About all we have is a basis of comparison with other communities as to our proficiency in dealing with certain materials and activities. We can trace definitely little, if any, connection between the materials and procedures we use and the child's actual social adjustment to the community life around him. It would, therefore, seem that the technic of the continuous vocational survey will contribute a valuable viewpoint to a course of study work in other fields of education.

Vocational Counseling Aided by the Survey

A fourth major value of the community vocational survey is its contribution to vocational counseling. Through their association with employees and employers the teachers get a new outlook on the occupational life of the community. Their thinking is stirred out of its old grooves. Because of the new point of view their work becomes more meaningful to them and thereby more influential in the lives of their pupils.

There are many obstacles in the way of the counseling program. It is difficult to get young people interested in suitable vocations, hard to keep them routed along the paths of their choice. Doubtless many of these difficulties are a result of the current social attitudes toward success. The materialistic standard and the prestige of the nonmanual vocations are in the saddle. If we can somehow or other bring about greater acceptance and wider recognition of the spiritual and social values in manual labor our problem will be greatly simplified. At this point the community vocational survey makes a vital contribution. Because of their broadened educational and social outlook the teachers are enabled to help children to see manual labor in its proper perspective. Of influence also will be the prominent place which the vocational program is given in the school and in the community. The right kind of newspaper publicity may bring some of the much coveted prestige even to vocational groups.

Too often have educators given out the impression that vocational education is in juxtaposition to academic education. A brief moment's thought will help us remember that even the most academic subjects were originally vocational, and today are distinctly vocational for some groups of students. The publicity given to the community survey tends to restore the balance of values and to correct a most malicious situation. As a result, education for the trades and industries of the community takes on a new dignity in the minds of the teachers and the students.

Education and Skill

Men must be educated to become more skilled in their lines of work. As time goes on, there will be more and more competition and a better product will be manufactured and used. The worker must strive toward a more symmetrical trade education. He must learn his trade thoroughly.—*I. B. Morgan.*

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine-shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

TROPHY TABLE

A. E. Smith, Head of Industrial-Arts Department, Public Schools, Sherman, Texas

A large trophy table for the Sherman High School trophy room was made in the industrial-arts department. The writer has never found a better class project for promoting interest on the part of the students taking part in the construction of it, nor has he found a better project for bringing the manual-arts work before the school and the city.

Twenty students took part in the building of this table. The major part of the woodwork was done under the direction of one student and the finishing under another.

The table was made of solid mahogany. The ends are 1¾ in. thick and have tenons which fit into the bases, and also pieces at the top which are added to keep the end from warping. The ends are held together at the bottom by the bottom rail and at the top by two pieces ¾ by 4 in. which are as long as the table. They are placed as shown in the plan, the notches being cut in the ends to receive them. This makes the bottom part of the table a unit which is independent of the top. The side rails, corner posts, and top make another unit. The two units are then easily joined together by screws which run through the two pieces that hold the ends together.

The carved ornaments were bought; the football, however, was turned by a student. The seams and strings were carved with a veining tool. The small corner moldings were run on the shaper, also the small mold around the ends. The football was secured to the bottom rail with a ¾-in. dowel.

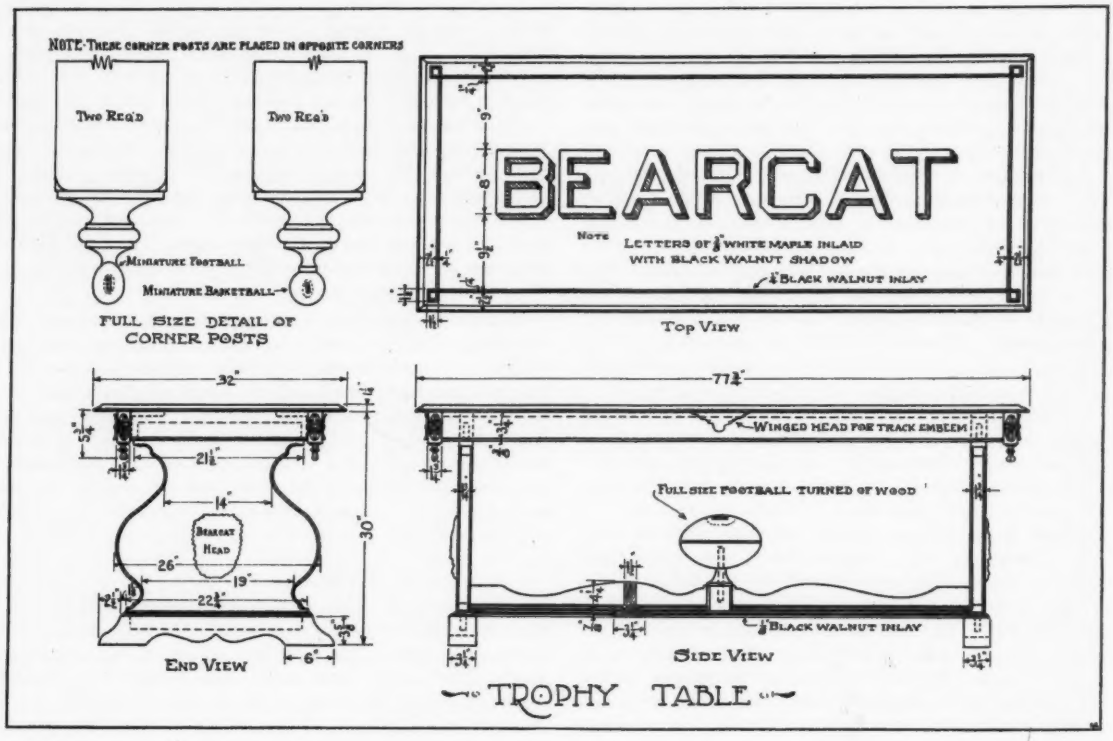
The word *Bearcat*, which is the name of the athletic team, was inlaid. The letters were made of white maple while the shadow was made of black walnut ¼ in. wide with miter joints at all corners.

The corner posts are 1¾ in. square and 5¾ in. long with two miniature footballs and basketballs placed on alternating corners. This school does not play baseball and this accounts for not having a baseball on one of the corner posts. In a school where all forms of sports are represented, a football, a basketball, a discus and a baseball could be used on the corner posts.

CLEAN UP THE GENERATOR BEFORE IT FAILS

Ray F. Kuns, Cincinnati, Ohio

The generating circuit of the passenger automobile is not as complicated as it seems. The Ford system which is representative of the better designs is shown in Figure 1. The camshaft is driven from the crankshaft and in turn drives the generator gear which is on the armature shaft. One wire runs from the generator cut-out to the ammeter, and another wire goes from the other post of the ammeter to the live side of the starting-motor switch. When the engine is running at low speeds the generator is not putting out enough current to charge the battery. The voltage is too low. The current and voltage that is available is used to build up the generator fields and finally the pressure or voltage is strong enough to pull the contact points of the cut-out together and as speed continues to increase there is current from the generator sent through the wire to the ammeter where the amount of current is registered. It then passes on and charges the battery. One side of the generator is grounded and likewise one side of the battery, thereby forming the return circuit for the current. When the engine slows down, the current reverses in the wire and now attempts to find its way from the battery to the



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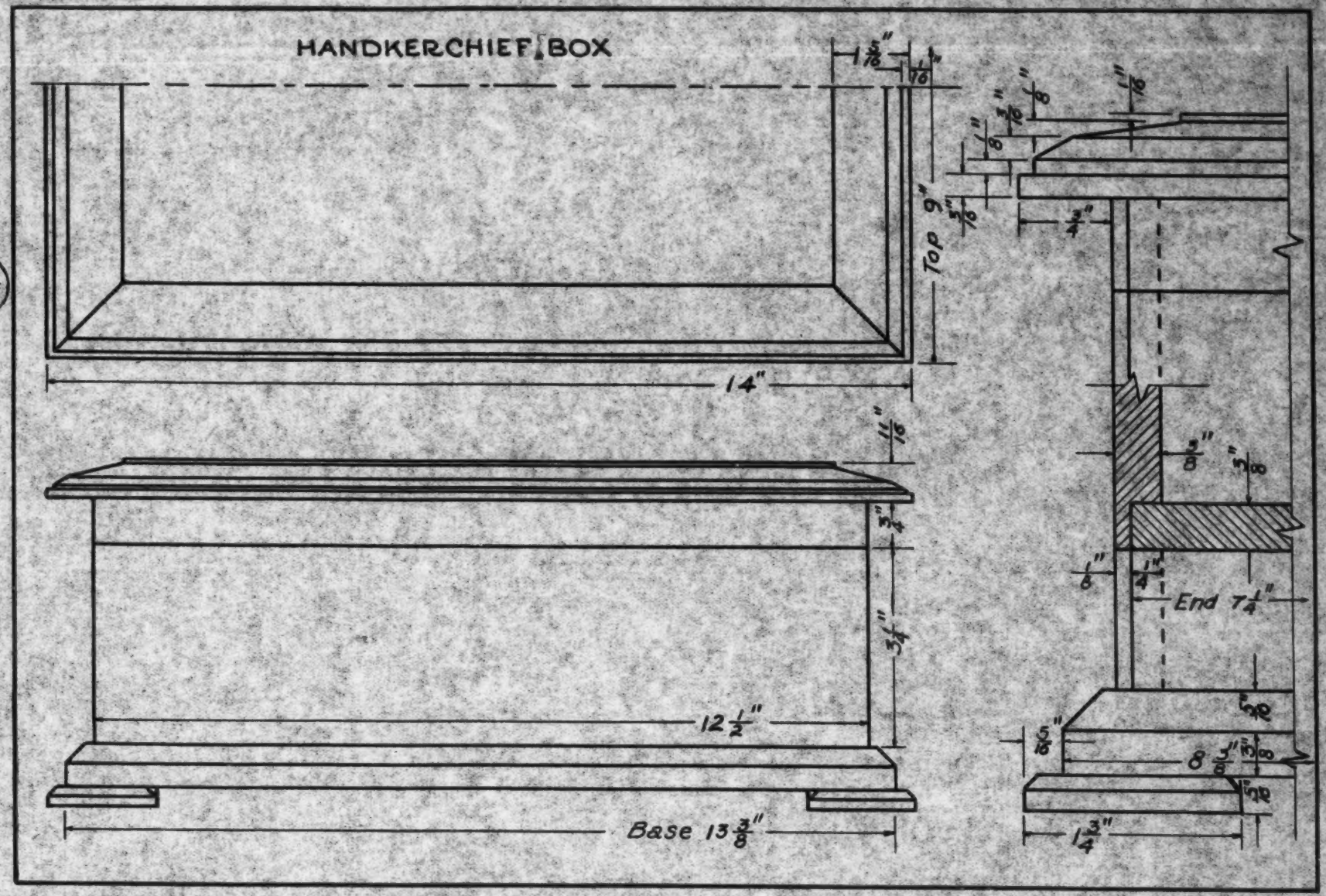
HANDKERCHIEF BOX



Designed by Geo. E. Myers, Everett, Wash.

For Details See Page 140, Industrial-Arts Magazine, April, 1928.

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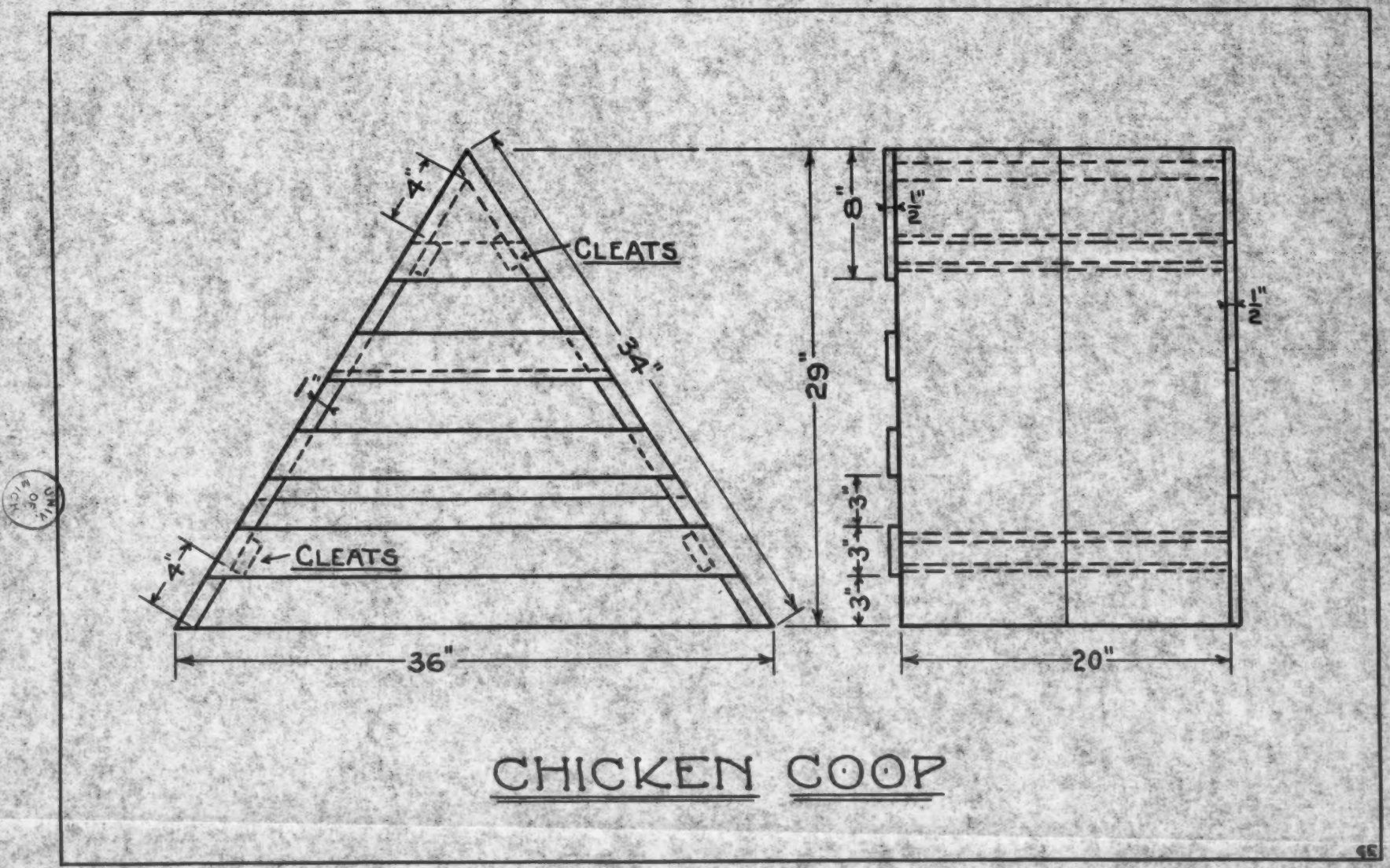

CHICKEN COOP

Designed by Leslie J. Miller, Rock Springs, Wyo.

For Description See Page 140, Industrial-Arts Magazine, April, 1928.

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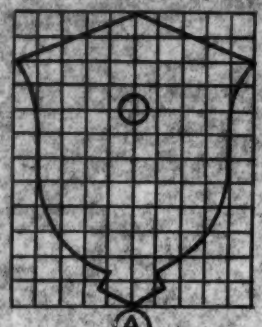
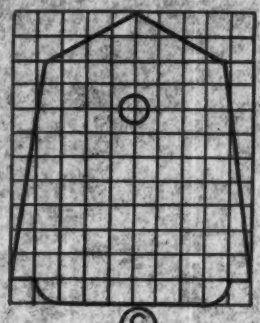
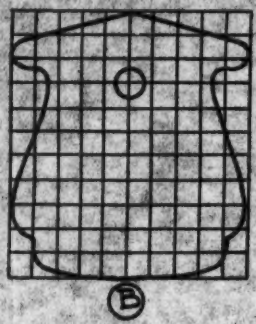
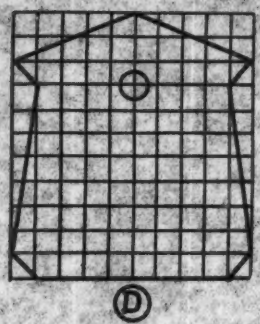
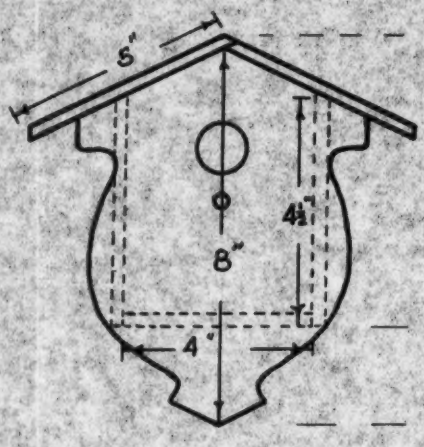
BIRD HOUSES

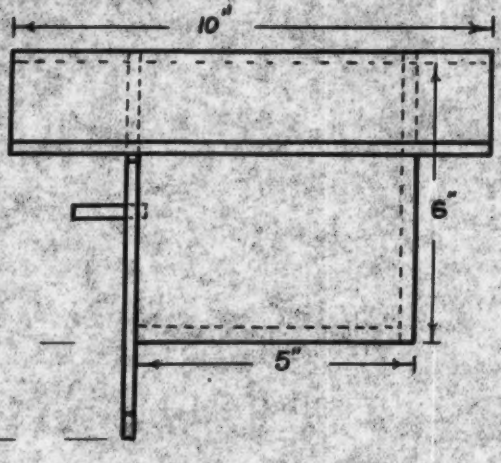












UNIV. OF MICH.

A-B-C-D- = Patterns for fronts
Use ¼" - ⅜" or ½" Material
Make 2 pieces 4½"x5" - Sides

Make 2 pieces 4"x4½" - Bottom
Make 1 piece 4"x6" End
Make 2 pieces 5"x10" Roof

- M.E. Dodge -

Designed by M. E. Dodge, Charlotte, N. C.

For Details See Page 141, Industrial-Arts Magazine, April, 1928.

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THE INDUSTRIAL-ARTS MAGAZINE,
APRIL, 1928

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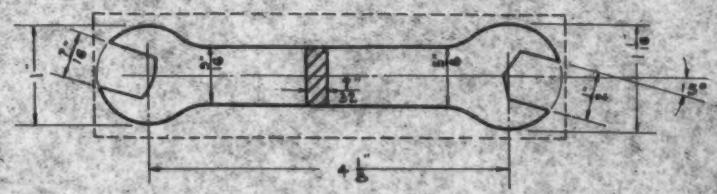
MACHINE SHOP JOB

Operations For Making A Wrench For 1" Bolt.

1. Cut from a piece of $\frac{1}{4}$" x 1$\frac{1}{4}$" machine steel, a piece 5$\frac{1}{2}$" long.
2. Machine to a thickness of $\frac{7}{32}$".
3. Coat with blue vitriol, to make a copper surface.
4. Scribe a center line.
5. Scribe the two circles for the heads.
6. Scribe the lines for the handle.
7. Scribe the fillets, joining the heads & handle.
8. Lay out the jaws
9. Make prick punch marks on lay out lines.
10. Drill thru these lines, using a $\frac{3}{16}$" drill.
11. Grind and file to lines.
12. Polish
13. Carbonize and harden heads only.

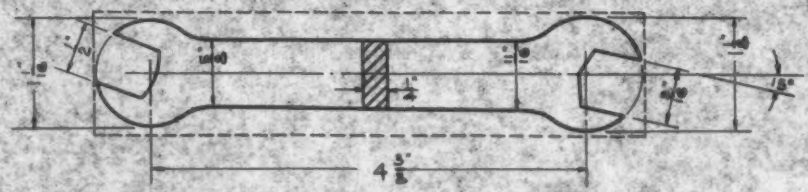
Wrench for $\frac{5}{16}$" Bolt

Square Head — Hex. Head



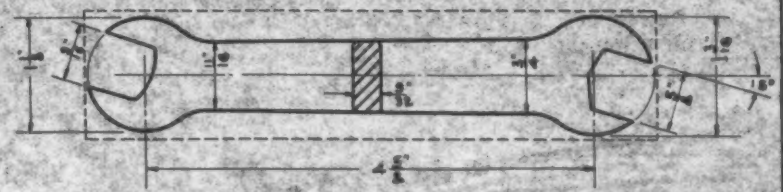
Wrench for $\frac{3}{8}$" Bolt

Square Head — Hex. Head



Wrench for $\frac{7}{16}$" Bolt

Square Head — Hex. Head



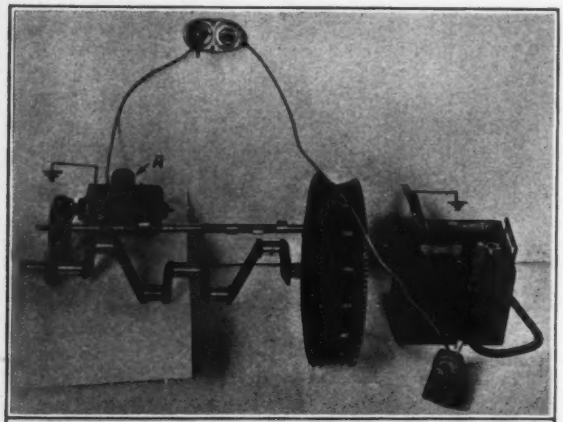
Designed by C. H. Niemann, Hammond, Ind.

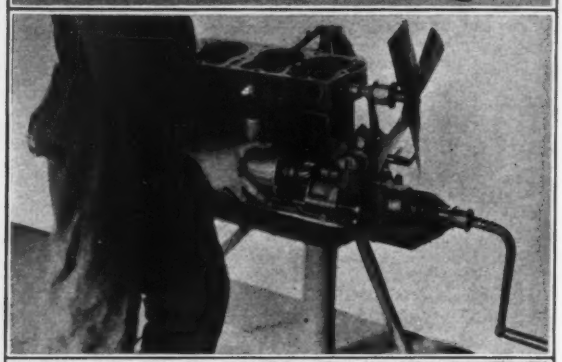
For Description See Page 140, Industrial-Arts Magazine, April, 1928.

generator, but the automatic cut-out is wound so that the instant this surge of current in the reverse direction comes, the points are thrown apart and no discharge occurs.

Some generating circuits are closed when the ignition switch is turned on, and opened when it is turned off. These require no cut-out.

Generators are mounted on the motor with various devices. The Ford has three bolts holding it and it may be lifted off when they are run out. Those hardest to remove are the ones driven by an inclosed silent chain. Sometimes this means that the timing-gear cover must be removed but this is rare. Usually the method of getting at the mounting bracket is easily discerned. If the ignition is driven from the generator, it is well to remember that unless it is possible to retain all gears in exactly the same relation as that existing at the start of the work, the ignition must be retimed.





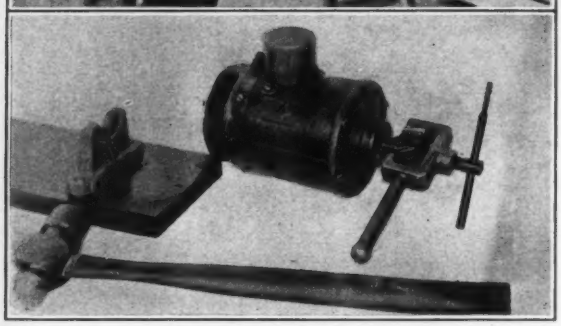


FIG. 1. AUTOMOBILE GENERATING CIRCUIT.
FIG. 2. REMOVING THE GENERATOR.
FIG. 3. REMOVING THE GEAR.

After the generator has been taken off, it should be cleaned on the outside and then taken to the bench. The front gear can then be pulled from the front end, if it interferes with the disassembling. In the case of the Ford, a pin holds the gear. This is driven out with a punch and the gear pulled as shown in Figure 3. Figure 4 illustrates the method of pulling the end plates and removing the armature. Watch all wires and connections carefully.

Figure 5 shows the brush rigging. It is not likely that this will need to be removed but the brushes should be taken from their holders and carefully cleaned. In fact, all parts should be rigorously inspected and carefully cleaned. Watch for places where the insulation shows weakness or signs of failure and tape these. Some of the

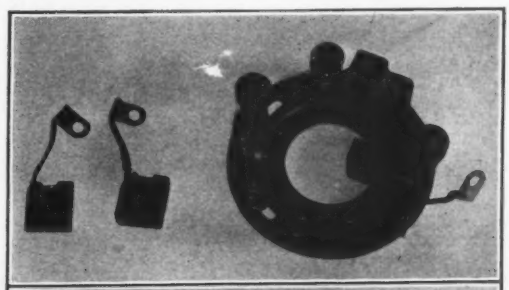
FIG. 4. PULLING THE END BRACKETS AND ARMATURE.

wires are grounded and some are insulated. Those which are insulated are recognized by the fibre bushings and washers used in mounting them to the brush rigging and other parts. These bushings may be cracked or worn and if in that condition should be replaced.

The position occupied by the brushes on the armature is shown in Figure 6. If the brushes are worn short, throw them away and place new ones in the rigging and then sand them to the commutator until they have good contact. The brushes frequently become oil soaked and are the source of much trouble and should be discarded. The commutator may be rough and the brushes inclined to hop. If this condition has existed, the best thing to do is to place the armature in the lathe and take a very light cut from the surface of the commutator bars. Then file the surface lightly and polish bright and smooth with the finest sandpaper. Next take an old hacksaw blade and mount it in a wood handle. Only 2 in. should project from the handle. Grind down the teeth of the blade until they are just as wide or thick as the strips of mica between the commutator bars. Use this tool to cut down the mica or undercut it from $\frac{1}{64}$ in. to $\frac{1}{32}$ in., preferably the first amount. Clean out any brass cuttings and knock off any small burrs with a fine cut file.

Finally, inspect the bearings. Clean them up and wash them out with kerosene. Then oil them with engine oil and pack them with light cup grease. You are now ready for reassembling the generator. Use care in this to see that all parts fit together properly and that the electrical connections are properly made.

Before replacing the generator on the car, test it to see whether it will run as a motor. To do this simply connect the generator to the battery by running one wire to the terminal screw on the generator and the other wire to the frame of the generator. This will cause the generator to run as a motor. If it turns over at a fair rate of speed the job may be considered satisfactory and the generator installed on the car. See that all connections and adjustments are snug and properly locked.



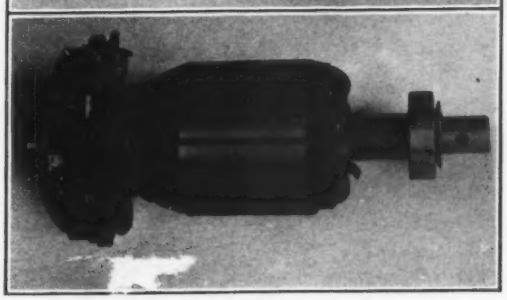
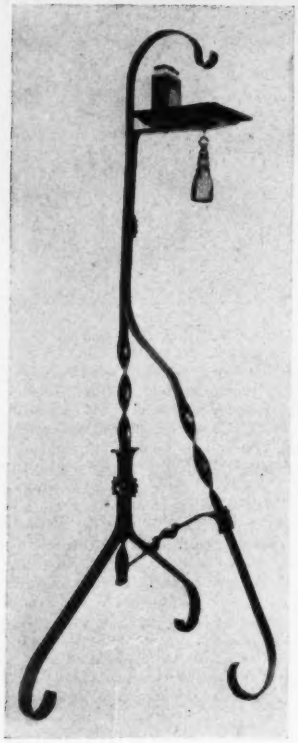


FIG. 5. BRUSH RIGGING.
FIG. 6. BRUSHES IN POSITION ON THE ARMATURE.

WROUGHT-IRON SMOKING STAND

E. W. Manzer, Wisconsin High School, University of Wisconsin, Madison, Wis.



The wrought-iron smoking stand illustrated herewith, has been in use for the past year. Its attractiveness and utility is such that it is really a worth-while project for any boy who is taking a metal-craft course.

The material used for the stand was strap iron or band iron ⅜ in. wide. The over-all height is 39½ in., and the height to the tray is 25½ in. The base is 14 in. wide. The front foot of the base projects 8½ in. The ash pan is hammered copper and measures 4 by 4½ in. The match holder is made from one piece and then folded to hold the small match boxes.

The large curve in the handle is very convenient when one wishes to carry the stand about the room. The small curve is made to accept a cigar. Green lacquer with high lights of bronze powder comprised the finish. The twisted part of the stand can best be made by placing the iron into a pipe that will just take the width of iron. The end of the iron is then clamped into a vise and the twist put in with a wrench.

A TABLE FOR THE JOURNALISM DEPARTMENT

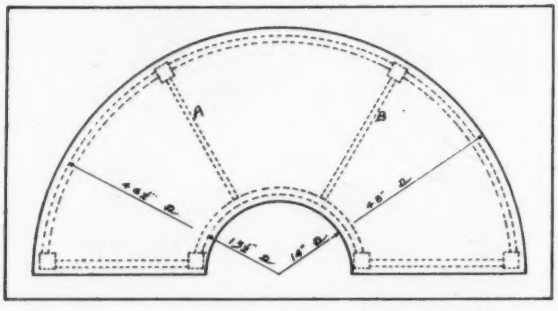
Robert A. Hardin, Nebraska Wesleyan Teachers' College

This problem will give the school another opportunity to "socialize" their departments. We cannot overestimate the value of a strong cooperative spirit between the various departments of our schools. By such influences the school advances as one solid unit instead of by segregated and unrelated elements.

This copy table was made in our woodworking shop for the journalism department. Its construction involves several problems of value to an advanced class. It involves benchwork, band-saw work, veneering, and wood finishing.

The first thing to do is to make a complete layout on a clean spot on the floor. The use of a full-size layout solves the problem of getting the length of side rails, location of mortise-and-tenon joints, and getting the correct bevel for the shoulders of the tenons.

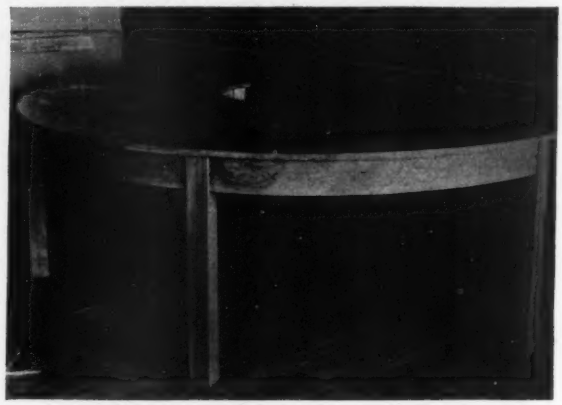
The top, it will be noticed, has a radius of 48 in. and is a semicircle. The side rails are set 1½ in. inside the top, making their radius 46½ in. The spacing of the legs on the layout will have to be done by trial as the framework is not a complete semicircle and



therefore a radius cannot be used. The legs measure 3 by 3 by 29¼ in.

The circular side rails are 1¼ by 5 in., and are built up of segments of chestnut or poplar. They are then veneered. We used ⅛-in. oak veneering, clamping it on with hand screws. It is well in making the small circular side rail to get the segments out ½ in. thicker than the finished size, saw to thickness on the band saw after gluing, and use the waste for clamping on the veneering. The straight side rails are made of 1⅛-in. oak and are not veneered. The cross rails, A and B, are very necessary for rigid construction. They are made of ¾-in. oak and are put in place after the rest of the frame is assembled. To make this possible, an open mortise is made in the circular side rail.

As to the order of assembling I would suggest that the small circular side rail be glued into its two legs first, then the remainder of the straight front be assembled. If you do not have a chain clamp for clamping up circular forms, use hand screws for clamping



COPY TABLE.

the large circular rails into place. This can be done by fastening one hand screw tightly on the rail about 2 in. from the end, and then using two more to clamp the leg up securely to the rail.

You can save lumber in making the top if you fit the boards to the layout before gluing up. The boards can be cut on the band saw. Joint them up, dowel them, and with two dowels in place clamp the boards together and draw the inside and outside semicircles. Then take the boards apart and saw them out, leaving an occasional projection on the curved edge to hold the clamps.

This table, in addition to being an asset to a journalism department, would make a splendid seminar table.

MAKING AN OCCASIONAL TABLE

John Y. Dunlop, Greenfield, Tollcross, Glasgow, Scotland

To the teacher who is blessed with a small millroom and feels the need of a useful model which might lead his students to understand the value of machine-cut stock for a curved and straight job, the accompanying drawing shows a very useful design.

The piece of furniture as shown was made in a school with no power so everything was done by hand.

Material

4 pc.	1¼ x 4 x29¼	Legs
2 pc.	1¼ x 2 x24	Top cross rails
8 pc.	1 x 2½ x12	Top side rails
2 pc.	1 x 3 x24	Bottom cross rails
1 pc.	¾ x33 x33	Top
1 pc.	⅜ x12 x12	Bottom shelf
12	2½-in. No. 11 f.h.b. screws	
16	1¾-in. No. 10 f.h.b. screws	

After the wood has been planed down to the right measurement, the four pieces for the legs are tapered to one inch thickness at the lower end.

Then comes the laying out of the leg which is done in the first instance on a thin piece of template wood.

The shape of the leg is then transferred to the actual material and the outline cut out with the bow saw.

The two bottom rails are dealt with in the same way after which the rough saw edges are finished up with the spokeshave and sandpaper.

The front edge of the legs should be slightly rounded, the inner edges being left square.

In finishing the lower rails taper the ends to half an inch where they enter the legs.

This means that the ends of the lower cross rail are made the exact size of the mortise on the legs so that there is no shouldering, the ends being simply housed in.

The top cross rails are prepared straight and have a rebated tenon on each end. Both sets of rails are half checked at the center as shown in the drawing.

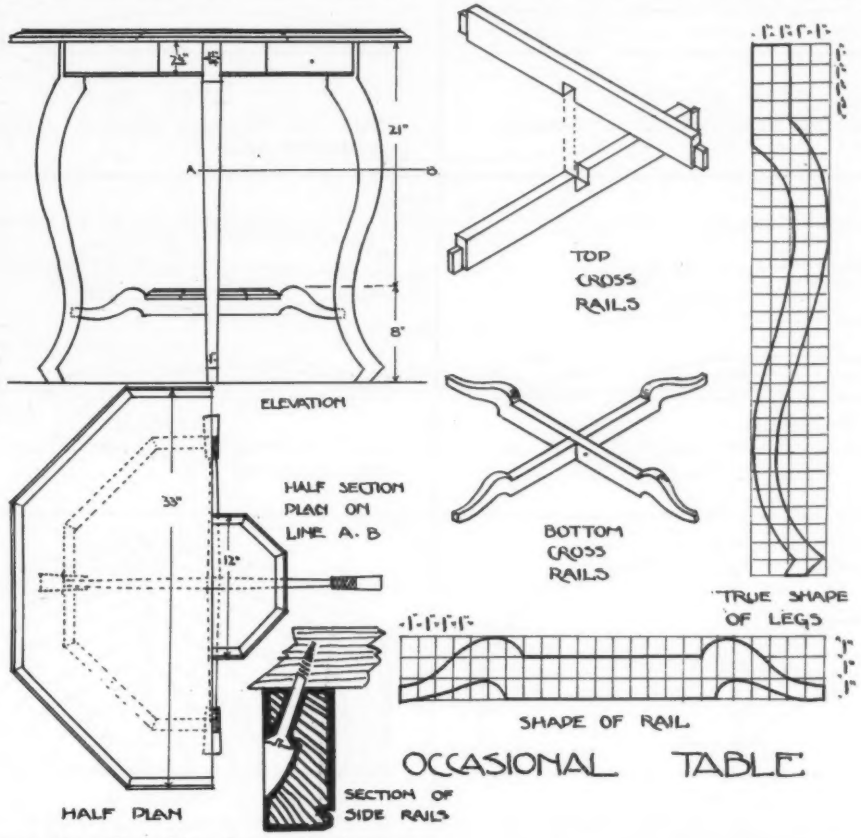
Mortise the legs to receive the ends of these rails and proceed to fit the joints and cramp the frame together.

The large top, which in all likelihood will be made up of two pieces, is now joined.

Choice can be made of a glued and rubbed joint, or one in which three ⅜-in. dowels are inserted.

For boys' work the doweled joint is more likely to be the strongest joint and it has the advantage that it can be drawn up with the cramp.

The lower shelf is now laid out in the shape of an octagon and trimmed smooth. The same is then done with the top of the table. Both of these parts are now splayed or molded on the edge, care being taken that the intersection of the ornamented edge is on



the arris or the square edge. The rails are then bored and countersunk to allow the top and shelf to be screwed on. In fitting the side rails in position the table is placed in an inverted position, and the rails are mitered and fitted on the underside of the top.

The joints are glued and each portion is screwed to the top with pocket screws as shown in the section of the side rails.

A great deal of the hard work in a model such as this, disappears when the parts can be cut out on woodworking machines.

Of course, when a class is started on the machine work of the job, the teacher would do well to give a talk on the development and economic importance of the machine to be used and the exact nature of the work which can be done with each different type of tool.

No opportunity should be overlooked in teaching the correct names of all parts of the mechanisms, and the flow of the power through the machine should be explained.

As simple as this procedure may seem to be there is no shop experience which will give the student an understanding of the machine and do it in so short a time as this will.

Perhaps of even greater value is the habit developed of analyzing any machine to be worked with. It is a habit which every young mechanic can profitably acquire.

BOATS

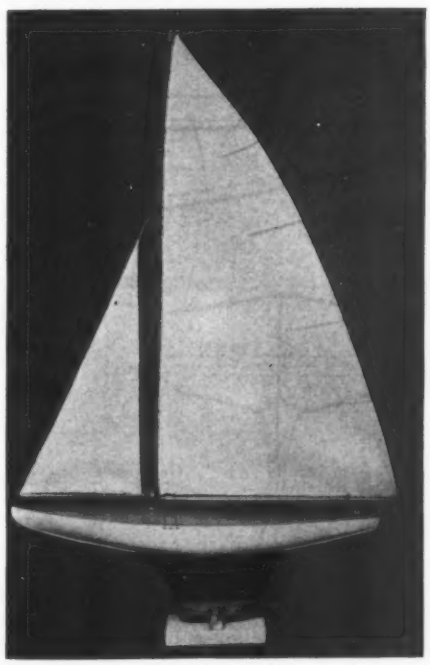
A. F. Bick, Milwaukee, Wisconsin

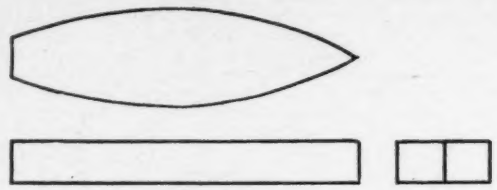
There is hardly a problem in manual training which can approach boat building as an incentive to accuracy and care. The boat should not be merely a toy, with lines of no particular meaning. Boys are interested in bigger things, in realities, for which they are constantly on the alert. Give them a problem, a real model of a racer, and they have what they actually crave for. They will do better work, and profit accordingly.

The model in the illustration is cut from a 3 by 6 by 22-in. white pine block, by the processes shown in steps 1, 2, 3, 4, 5 (outside hull), and up to step 12 for the remainder. The lines were drawn as nearly as practical from plans of racing yachts.

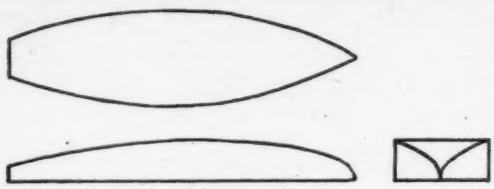
This was successfully used as a problem in 6th, 7th, and 8th grade manual-training shops. About 75 boats were made.

The boys are told that any cut below the line necessitates the alteration of the entire plan, since the symmetry and balance are then lost. They begin by roughing with a chisel and mallet, and cut to the line with a spoke shave, (steps 1, 2, 3), and use the latter tool alone in steps 4 and 5. The most difficult work for them is the cut at the bow in steps 3 and 4, where they are told to go slowly and not to remove their line. Before proceeding to step 5, the boys

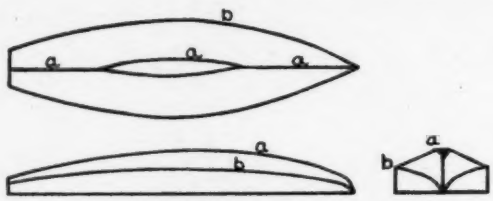




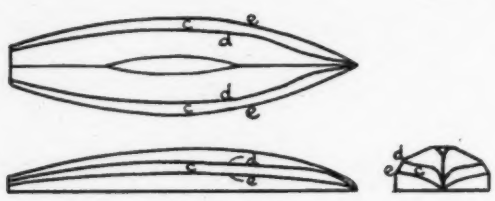
STEP 1
CUT BLOCK TO DECK SHAPE STRAIGHT DOWN.



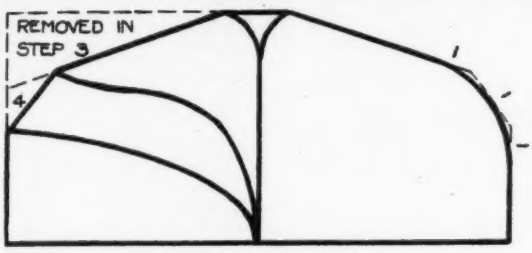
STEP 2
CUT TO PROFILE SHAPE STRAIGHT ACROSS BLOCK.



STEP 3
CUT FROM CENTER AND FIN LINE (a) STRAIGHT TO LINE ON SIDE (b)



STEP 4
CUT SURFACE (c) FROM LINE AT "d" TO LINE AT "e"



STEP 5 (RIGHT)
NOTICE HOW LITTLE IS CUT AWAY TO MAKE HULL CURVED.

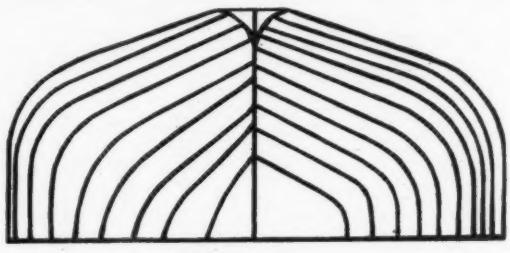
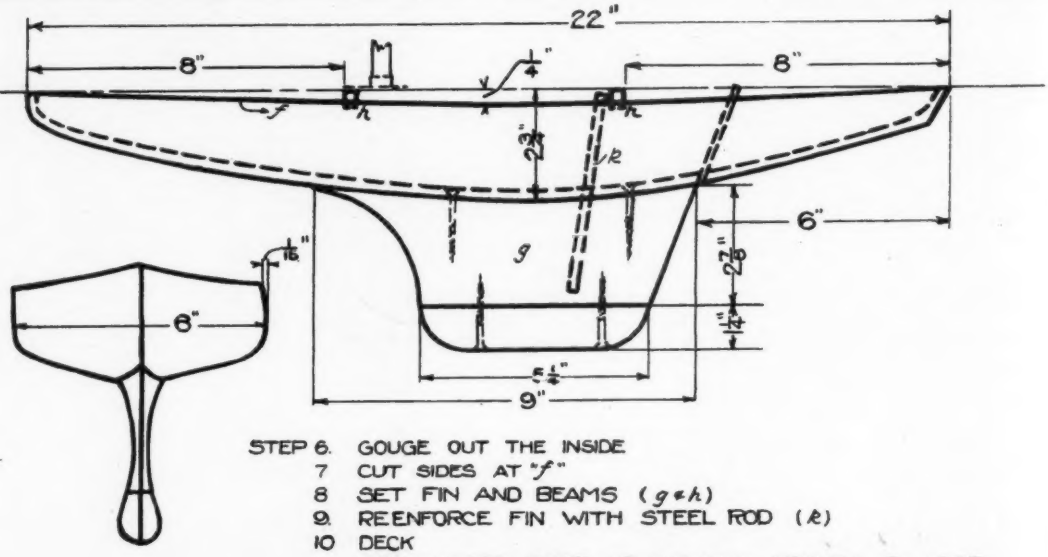
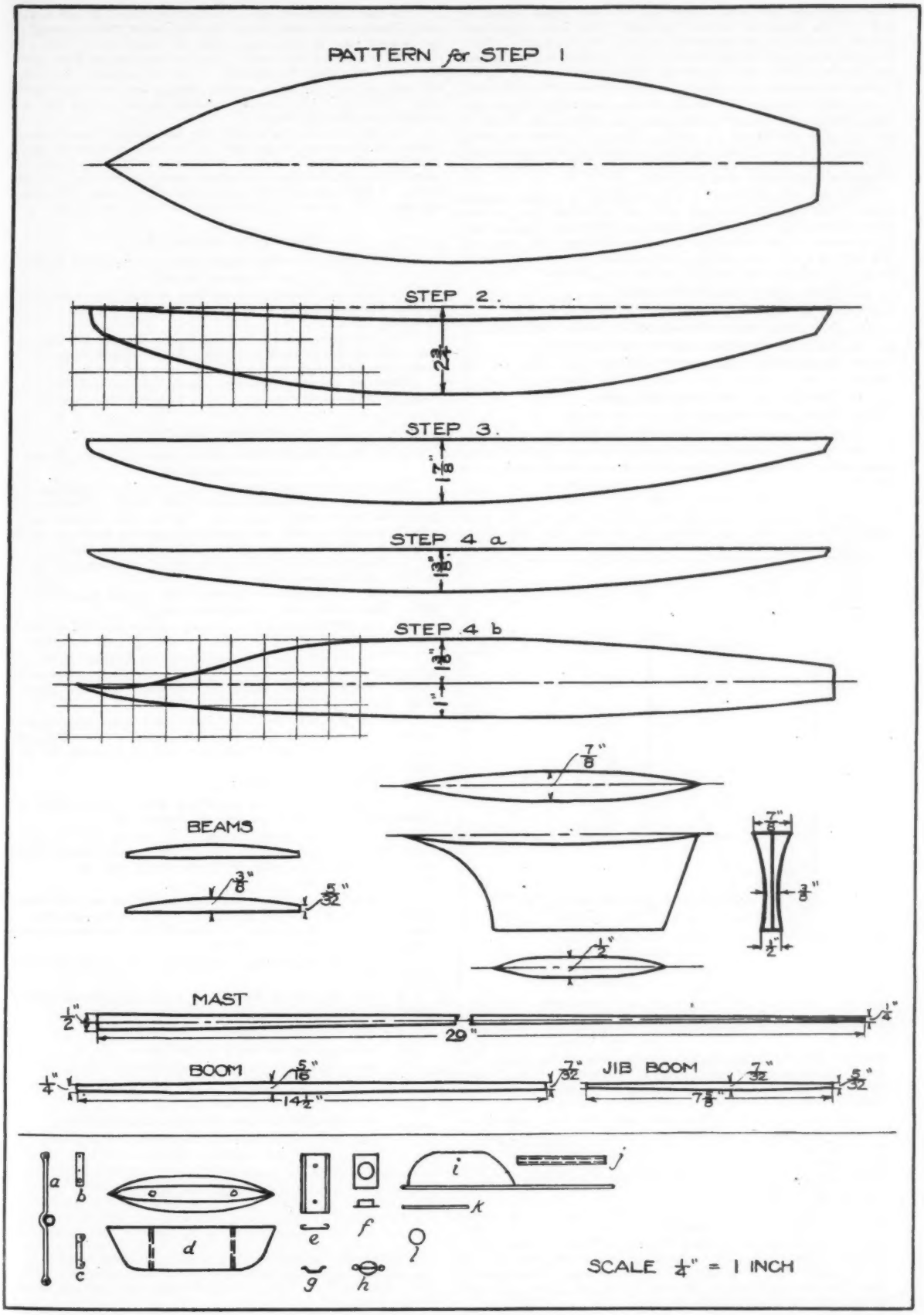


FIGURE 6
SECTION AT EACH INCH FROM BOW (LEFT) AND FROM STERN (RIGHT)



STEP 6. GOUGE OUT THE INSIDE
7 CUT SIDES AT "f"
8 SET FIN AND BEAMS (g & h)
9. REENFORCE FIN WITH STEEL ROD (k)
10 DECK
11 TRIM UPPER EDGE AS SHOWN IN DRAWING ON LEFT
12 DRILL HOLE FOR RUDDER TUBE FASTEN ALL METAL PARTS.

METHOD OF LAYING OUT AND CARVING A MODEL YACHT HULL.



DETAILS OF MODEL YACHT.

must understand how little is cut from the two ridges marked *d* and *e*, in the illustration, to curve the sides. This curve, when seen point of which is a line down the center of the surface *c*. After in section at any point along the side, forms a perfect arc, the highest step 5, the hull is filed lengthwise, and sanded across the grain, holding the sandpaper on a block to remove all file marks and ridges.

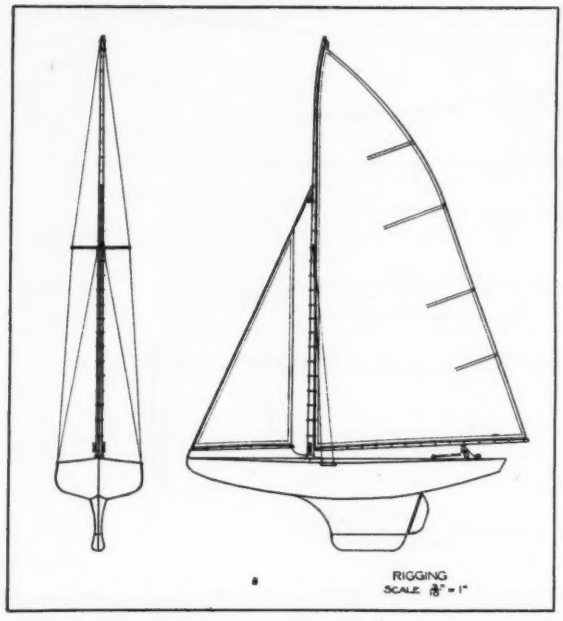
A block of wood was fastened to the deck while shaping the hull. This is now screwed to the bottom to hold the boat firmly in the vise while cutting out the inside. The boy is taught to gouge from the center to the sides and finish the latter to ¼ in. as he goes down. No side finishing can safely be done after the bottom is thin. Proportional calipers are used for testing.

The top edge of the hull *f*, is now trimmed to a long sweeping curve, ¼ in. deep in the center, to which the warped deck is later nailed. Beams are set 8 in. from each end of the boat, both to hold the curvature of the deck, and to support the mast and steel rod. The latter is put in after the fin is set in place, and serves as a brace for the fin, reducing the strain on the thin boat bottom.

The fin is made in the following order:

1. Cut profile shape.
2. Draw center lines on the ends and on the top and bottom.
3. Trace top and bottom patterns over center lines.
4. Plane faces so that bottom of fin is ½ in. thick and top remains ⅜ in.
5. Plane back to shape, using shear stroke.
6. Chisel front to shape.
7. Chisel groove ⅛ in. deep on each side lengthwise.
8. Curve sides with chisel and cabinet file across grain of curve, using groove as bottom of curve, and top and bottom edges as its height.
9. Cut top of fin to shape of hull.

The fin is screwed on while being held in place by two small brads. The steel rod is put through the fin from the inside of the



boat, the top end being fastened to the center of the beam. The deck is nailed on with ½-in. brads, ⅜ in. apart. It is ⅛ in. in thickness and marked with a screw-driver bit before it is warped, to resemble planking. Then wet it and clamp it into shape.

The keel is cast in an iron mold with two 3/32-in. tapered steel cores for screw holes. It is easy to melt lead over any gas flame. It should be very hot when poured, and the mold should be warm. The rudder tube is set in on a line with the back of the fin, and the rudder bearing *b*, is nailed to the bottom of the fin, after which the keel may be screwed on.

Screw the mast step *e* to the deck 7¼ in. from the point *f*. The mast slides into *e*, and provision is made to allow for an adjustment of the height of the mast to give the boat the correct sailing balance. Chain plates *c* are nailed to the side of the boat 1 in. back of the mast step. The wires from the masthead and spreader *a* draw the mast backward as the wire for the jib draws it forward, holding the mast firmly in position.

The boat is equipped with a Marconi rig, a large jib and a main sail. The former is laced to the jib boom below, and is strung on the forward wire by tiny rings, which are sewed to the sail. The main sail is provided with similar rings for lacing to the boom below and to the mast above the spreader. Below the spreader, ½-in. rings are used, so that if the sail is unlaced above, it may be lowered to the deck. The ropes pass through miniature pulleys *h* and are tied to cleats *g* on the mast below.

The rope from the main boom (fish line is used) passes through pulleys also, but is tied to the tiller, so that when the boat lies on its starboard side, the main sail draws the tiller to starboard, and vice versa. This, with the mast arrangement, keeps the boat on a straight course. A light adjustable spring holds the tiller in place. The mainsail can pull it only as far as the tension on the spring allows.

OPEN-END WRENCHES

C. H. Niemann, Technical High School, Hammond, Indiana

(See Supplement No. 88)

The open-end wrench is an excellent problem for machine-shop students who need layout work, and at the same time want to make something useful.

The sizes given are for standard bolts and nuts and therefore these wrenches can be made in quantity for the various shops, or the student can make them for his own personal use at home.

There are thirteen operations required, as indicated, and these should be followed very closely, in order to get the best results.

HANDKERCHIEF BOX

Geo. E. Myers, South Junior High School, Everett, Wash.

(See Supplement No. 89)

This box offers a very desirable project for the student who does not want to start a job which requires much lumber. It will test the skill of the best to make a good job. The box may be made entirely with hand tools, or it will give experience in making angle cuts on the variety saw. The writer built the box by the following procedure:

1. Square up stock ⅜ by 4¼ by 42 in., or 2 pieces ⅜ by 4¼ by 21 in. for sides and ends.
2. Cut and square two end pieces 7¼ in. long from the above stock. These pieces must be accurately squared.
3. Cut two side pieces 12¾ in. long. These ends will be dressed after the four pieces are glued together, so they need not be perfect.
4. Lay out side pieces in duplicate to cut a rabbet ½ in. wide and ¼ in. deep. Care must be taken to get the distance between the shoulders exactly 11¾ in. Gauge the thickness of the tenon (⅛ in.) rather than the depth of the cut.
5. The pieces may be scraped and sanded before they are glued together. You will need the help of your instructor before attempting gluing. A three-sided box of heavy pieces will aid in getting the joints exactly true.
6. The base may be formed next.
7. Form the top, using a marking gauge, square, knife, and rabbet plane, if the job is not done on a variety saw.
8. Square stock ⅛ by 1¾ by 10 in. for the feet. Bevel one edge. Bevel the right end of two pieces before sawing them to length. Bevel the left end of the other two before sawing them off.

To Assemble the Box:

1. Drive two or three ¾-in. brads into the top and bottom edges of the sides. Cut off the heads. Locate the top and press the brads into the wood so it may be relocated after the glue is applied. Locate the base in the same manner.
2. Glue top and bottom to the sides. Use shaped glue blocks on the top.
3. Place the side of the box on a piece of 1-in. dimensioned stock and saw the box open, using the band or table saw.
4. Dress the edge just sawed.
5. Locate and set the hinges for the cover.
6. Fasten on the feet, using glue and brads.

CHICKEN COOP

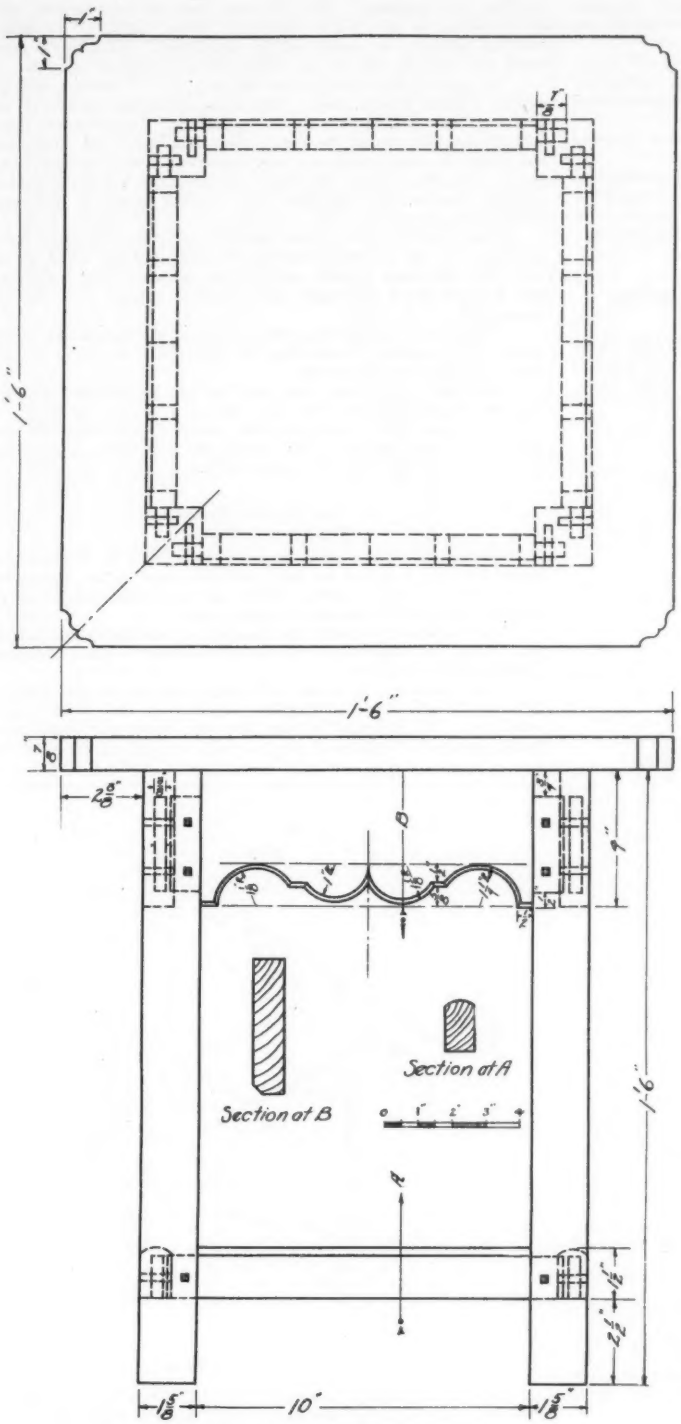
Leslie J. Miller, Supervisor of Industrial Arts, Rock Springs, Wyoming

(See Supplement No. 90)

Bill of Material

4 pc.	1x10x34	Sides
4 pc.	1x 2x20	Cleats
8 lin. ft.	½x3	Slats
8 lin. ft.	½x8	Back

Fasten the ends together with cleats, bring them together at the top end and measure for the proper spread at the bottom. Nail the 8-in. pieces on for a back. Turn the coop over and nail the slats on the front.



SQUARE-LEGGED JOINT STOOL

Designed by Franklin H. Gottshall, Mount Berry School for Boys, Mount Berry, Ga.

The joint stool here shown follows early American precedent in its design. Although it has square legs, and although its lines are rather simple, it is nevertheless a beautiful piece of furniture and makes a fine problem for the average school shop. The style is contemporaneous with furniture of the period about 1700. It can be made of pine but it is better to make it of either oak or maple, since it was of these two woods that most of the early pieces of this type were made. Strange to say, early American cabinetmakers often put pine tops on pieces made of oak or maple.

All the joints are mortised and tenoned and they are pinned with square oak pins. These pins are at least ¼ in. square, and are always driven into a round hole which is bored about ¼ in. from the inside edge of the leg, after the stand has been fitted and glued together. It is important not to have them too far from the inside edge of the leg since they are most effective if they go through the tenon as near the shoulder as possible. The reason for the square pen in the round hole is that it will always fit tightly, since the diameter of the hole and the width of the peg across the flat part are the same. Large table tops at which twelve people can be seated, have been fastened down with nothing else and they have never become loose.

One of the things about the stool that make it so attractive is the fact that all joints come flush on the outside. This gives a beautiful dressed-up effect that cannot be equalled by the offset joint which is in almost universal use in present-day practice. Some teachers may argue that this will not allow enough wood on the outside of the mortise and thereby make a weak joint.

This deficiency is more than overcome by the longer tenon used in this type of pinned construction. If the mortises and tenons are carefully fitted the result will be most satisfactory and pieces constructed in this manner have been found amply strong at this point.

The upper edge of the lower stretcher is slightly rounded as shown by the section at A. The scrolled edge of the apron is also beveled as shown by the section at B. The top can be fastened by means of square oak pins driven through the top into the stretchers, a little glue having first been applied to them. Drive these pegs at an angle of about 60 deg. If this is carefully done and the pegs are carefully cut off so they are smooth with the top, it will add to, rather than detract from its appearance.

The stand when completed can be used to hold plants or can be placed next to an easy chair to hold books, magazines, or a smokers' outfit.

BIRD HOUSES

M. E. Dodge, Central High School, Charlotte, N. C.

(See Supplement No. 91)

I do not believe that there are many boys who do not thoroughly enjoy building bird houses. The drawings illustrate a house that is always interesting to build because of the varied designs that may be used for fronts. This house may be hung in a tree, fastened to a post or placed in the gable of a building.

By studying the drawings you will find that the house is nothing more than a box with an artistic front. Figures A, B, C, D are a few suggested designs that may be used for fronts. Transfer the design to a piece of heavy paper by the square method. The squares,

through which the design is traced, are made ¼ in. square. Original designs may be cut by folding a piece of heavy paper through the center and cutting.

Any kind of thin wood may be used in building the house although softwoods such as white pine and poplar are preferable. Wood from packing boxes furnishes the finest kind of material with little or no expense to the boys.

A coping saw is necessary in constructing the house but the other tools to be used depend on the grade and age of the boys.

The hole in the front is made large enough to suit the kind of bird that is to occupy the house. A 1-in. hole is large enough for wrens. Bore a ¼-in. hole, 1 in. below the entrance, in which to insert a perch. Give the house a coat of shingle stain or two coats of paint.

UTILIZING AN ASSIGNMENT CARD FOR THE SCHOOL PAPER

Mr. Robert R. Karch, printing instructor at the Harding Junior High School, Steubenville, Ohio, tells of an assignment card which he has used successfully in making assignments for the school paper. The card contains six columns, giving space for the subject of the

ASSIGNMENTS FOR SCHOOL PAPER

FOR WEEK BEGINNING _____ 19__

Check If In	SUBJECT OF ARTICLE TO BE WRITTEN	See the Following for Information	Amount of Words	Date Copy or Drawing of	ASSIGNED TO THE STUDENT NAMED BELOW
	Advertising				
	Alumni Notes				
	Art Department				
	Assembly (morning)				
	Athletics				
	Band				
	Biology Club				
	Boy Scouts				
	Cafeteria				
	Circulation				
	Commercial Club				
	Custodians				
	Dramatic Club				
	Editorial				
	Editorial				
	English Club				
	Exchanges				
	Glee Clubs				
	Girl Reserves				
	Hikers Club				
	Health Club				
	Health Dept.				
	Household Arts Dept.				
	Jokes				
	Literary				
	Manual Training				
	Mechanical Drawing				
	Music Department				
	Office				
	Orchestra				
	Rooms 100, 200, 301				
	Rooms 202, 303, 304				
	Rooms 206, 306, 308				
	Rooms 302, 303, 304				
	Rooms 305, 306				
	Rooms 307, 308, 309				
	Science Club				

article to be written, any special information, amount of words, time due, name of student, and whether received or not.

The card has been printed in the belief that it is an entirely new scheme and one that may be of advantage to other printing instructors who have charge of the printing of a school paper.

TOOL-CHECKING SYSTEM FOR THE WOODSHOP

Leslie J. Miller, Rock Springs, Wyoming

Various systems of tool checking have been tried out in our woodworking department with indifferent success. When our new shop building was erected a great deal of attention was given to the building of a toolroom. The individual tools are kept in kits, each kit containing a jack plane, smoothing plane, backsaw, try-square, marking gauge, ¼-in. chisel and a ¾-in. chisel. Each kit is numbered and each boy uses the kit corresponding to his roll number.

TOOLROOM REPORT

Period_____ Date_____

Toolroom Attendant_____

Kits in use	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27

GENERAL TOOLS

Student	Tool	Check Out	Check In	

The general tools hang upon the walls of the toolroom with an outline painted behind them. Before the attendant takes over the toolroom, the instructor unlocks and inspects it. The attendant enters and fills out the top of the report sheet here illustrated. He must put down his own name, the day, month and year, and the class periods his group occupy the shop. As he hands out the individual kits he inspects each one and puts a check mark in the space allowed for each kit.

When general tools are borrowed the toolroom man writes down the name of the student borrowing the tool, and the name of the tool. He also places a check mark in the check-out column when the tool is taken and a like mark in the check-in column when the tool is returned.

When the individual kits are returned at the end of the double period, the attendant checks them in and refuses to accept any kit that is damaged or incomplete.

Each boy in the class must take his turn as toolroom man and has that responsibility one day at a time.

Before the class is dismissed the attendant must hand his toolroom report sheet to be checked out by the instructor. This system has been found to work very satisfactorily.

A GATE-LEG TABLE

Margaret Fullerton

Gate-leg tables have been used for generations in England, few homes being without one or more, and they seem to be coming into general favor in this country. They can be bought in any of the period designs from reputable manufacturers.

The one shown herewith was designed as a tea table for a college girl's room, but might serve equally well whenever a small, compactly folding table is required.

The construction is of the most simple and sturdy type, and it is such that a high-school woodworking student can make it at a minimum cost. As indicated in the drawings, blind mortise-and-tenon joints, reenforced with dowel pins, are used in building the gates and

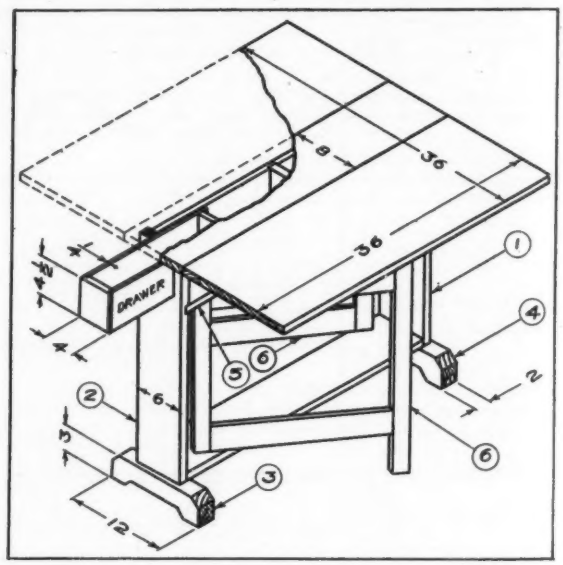


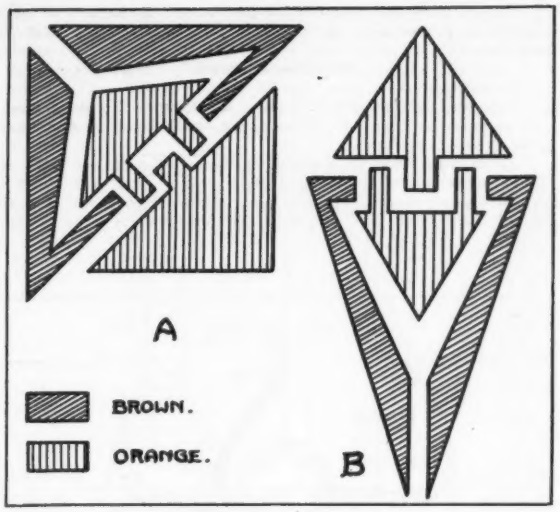
FIG. 1. GATE-LEG TABLE.

in fastening the uprights 1 and 2 to the feet 3 and 4, Figure 1. The upper stretcher, 5, is dadoed into 1 and 2, while the lower is fastened to the feet by means of round-head screws. The side rails are fastened to the ends with dowels.

The storage space available in a college dormitory room is usually limited to a clothes closet, study table, a couple of window ledges, and the students' trunks. None of these are ideal places for the keeping of silver, napkins, boxes of tea and sugar, and cans of condensed milk.

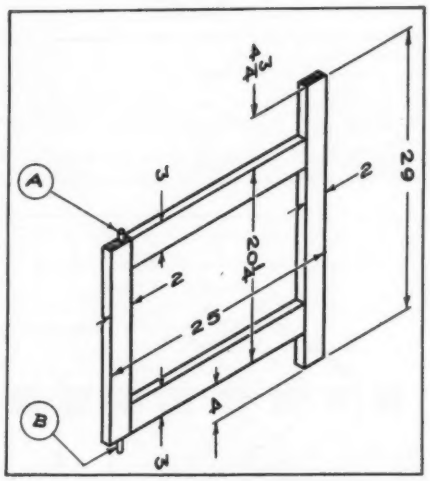
These are necessities however, for college girls, like boy scouts, are always hungry. They therefore especially appreciate the convenient arrangement of drawers in which the material for their tea parties can be kept ready for use. This unique feature should appeal to others as well as to college girls.

The table originally made from this design was built of pine, and finished with yellow enamel stenciled in orange and brown. Stain, or enamel of other colors, might be used if preferred.



DECORATION FOR GATE-LEG TABLE. A, CORNER STENCIL; B, STENCIL FOR UPRIGHT.

The following list of material gives the finished dimensions of the various pieces. If rough lumber is purchased, allowances for finishing must be made.



2 pc. ¾x14 x36	4 pc. ¼x 4½x16½
1 pc. ¾x 8 x36	2 pc. ½x15¾x 4
2 pc. ¾x 6 x34	2 pc. 2x 3 x12
2 pc. 1x 6 x28	4 dowel pins ⅜x2
2 pc. ¾x 4½x32	12 dowel pins ⅜x3
4 pc. ¾x 3 x23	16 dowel pins ⅜x¾
2 pc. ¾x 2 x21	2 small drawer pulls, any style desired
2 pc. ¾x 2 x29	6 round-head blued screws, 1½ in. No. 12
2 pc. ¾x 4½x 4	2 pairs butt hinges, ⅜x2.

TEACHING TYPE JUSTIFICATION

Frank P. Rich, Boston, Massachusetts

One of the fundamental requirements of good type composition is that the spacing pieces between words in a line of type shall be apportioned so as to appear equal.

When the beginner in printing is ready to set type, he is told to place one 3-em space after each word before starting the next word of the copy. The pupil proceeds to follow instructions. Everything appears simple until the end of the line is reached, when it is found that there is not enough room between the last 3-em space and the side of the stick for the next word or syllable of a word.

To merely tell the pupil to make the line tight at this stage of the lesson will mean little or nothing. Many are the ways the pupils will find to make the line tight. Some will fill the remaining space with spacing pieces of every size, while others will put in as many letters of the next word as will fit in the space, regardless of the proper syllabication. To forestall the acquiring of these and other improper methods, the beginner should be taken in hand now, and taught the operations or steps necessary to make the line tight.

The first step is to teach the pupil how to change the 3-em spaces to spaces of another size in order that the line of type may fit the measure of the composing stick. This problem of correct spacing between words in a line is called justification, and to the beginner it is a very puzzling and inconsistent process.

Since most lines of type require respacing, or justifying, and as no two lines seem to require exactly the same kind of justification, it is natural that the beginner should be confused and uncertain.

In order then, for the student to acquire this knowledge and skill, the relative sizes of the different spacing pieces in a font of type with which this respacing must be done must first be learned.

Teaching the Spacing Pieces

There are two classes of spacing pieces, namely, spaces and quads. All spacing pieces are fractions or multiples of the em quad. The em quad is a square spacing piece of the size of type with which it is used. There are 6-point ems, 8-point ems, 10-point ems, etc. Other quads are the 2-em quad and the 3-em quad, which are two and three times as wide as an em quad, of its own point size.

The spaces also vary in size, and each different size is known by the fractional part of an em its face is wide. In the ordinary font of type, four different sizes of spaces are used. The names of these spaces, beginning with the thinnest, are 5-em, 4-em, 3-em, and 2-em or en. The 5-em space is so called because it takes five of them combined to equal the width of an em quad. Similarly it takes four 4-em spaces to make an em, three 3-em spaces to make an em, and two 2-em spaces or en quads to make an em. The terms 5-em, 4-em, 3-em, and 2-em are contractions of 5 to the em, 4 to the em, 3 to the em, and 2 to the em.

The relative widths of the different spacing pieces having been learned, the beginner should be required to make a table listing the many spacing combinations possible for increasing the space between words, and arrange them in their logical order of procedure, as follows:

The Logical Order of Procedure

1. 3-em
2. Two 5-em
3. 5-em and 4-em
4. En quad
5. 5-em and 3-em.
6. 4-em and 3-em
7. Three 5-em
8. Two 3-em
9. 5-em and en quad
10. 4-em and en quad
11. 3-em and en quad.
12. Two 5-em and en quad
13. 5-em, 4-em, en quad
14. Em quad

A table listed and arranged like the foregoing would enable a beginner to see readily that if it is necessary to justify a line of type to the measure of the composing stick by respacing it, replacing the 3-em spaces with wider spaces, or wider spacing combinations, the next wider spacing combination is made by using two 5-em spaces, since two fifths are wider than one third, and are narrower than one half, or any other possible spacing combination. The next combination would be the 4-em and 5-em spaces used together, while next in order would be the en quad, etc.

The Commercial Order of Procedure

In most commercial printing plants the time element is the greatest factor to be considered rather than the very fine exactness of the justification. With this important fact in mind, and in order that much time may be saved in the respacing of lines of type when 3-em spaces do not fill the measure of the composing stick, certain of the spacing combinations in the logical order of procedure, are quite often omitted and the next spacing combination in order is used, as follows:

1. 3-em space
2. En quad
3. 3-em space and a 4-em space combined.
4. Two 3-em spaces combined
5. 3-em space and an en quad combined

Example: When the use of 3-em spaces placed between words in a line do not fill the measure of the composing stick, *they are replaced with en quads* in as many places as possible *instead of using two 5-em spaces, or the 5-em and 4-em space combination* to make the line tight.

If en quads have been placed between all the words and the line is still loose, *the 5-em space and 3-em space combination is omitted* and the en quads are *replaced with the 3-em space and 4-em space combination,* in as many places as is necessary to make the line tight, and so on as listed on the chart.

For teaching purposes, the logical order should be taught first, and then, by means of comparison, the amount of time saved, the fewer spacing pieces necessary, and the very small difference between the spacing pieces used and those omitted will appeal to and impress the beginner at once.

Impress the pupils with the necessity of carefully reading over each line of type before attempting to justify it. The omission of one letter may mean a great deal of work if it is not discovered in time.

The following chart describing the *commercial order of procedure* for increasing the amount of space between words in a line of type to make it fit the measure of the composing stick has proved of great assistance to beginners in teaching type justification. This chart is placed in a conspicuous and accessible part of the shop where it is an everready source of information, saving many teaching minutes.

Type Justification

Order of procedure for increasing the amount of space between words in a line of type to make it fit the measure of the composing stick.

First → Place one **3-em Space** between words in a line of type.

Second → When the use of 3-to-em spaces placed between words in a line do not fill the measure of the composing stick, replace the 3-em spaces with an **En Quad** in as many places as is necessary to make the line tight.

Third → If en-quads have been placed between all the words and the line is still loose, replace the en-quads with a **3-em Space and a 4-em Space Combined** in as many places as is necessary to make the line tight.

Fourth → Should the 3-em space and 4-em space combination fail to fill the measure of the composing stick, they should be replaced with **Two 3-em Spaces Combined** in as many places as is necessary to make the line tight.

Fifth → Proceeding further, should two 3-em spaces combined fail to fill the measure of the composing stick, they should be replaced with a **3-em Space and an En Quad Combined** in as many places as is necessary to make the line tight, etc.

REDUCTION OF THE TYPE JUSTIFICATION CHART MEASURING 8 BY 12 IN.

A Word About Thin Spacing

If all but one letter of a word or syllable will fit the measure of the composing stick in a line of type, the 3-em spaces may be changed first to 4-em spaces. Should further thin spacing be necessary, the 4-em spaces may be changed to 5-em pieces. Three-em spaces and 5-em spaces should not be used together in a line of type.

HOW TO RECORD AN ARMATURE WINDING

Geo. A. Willoughby, B.Sc., E.E., Saginaw, W.S., Michigan.

Figure 1 is a sketch of a simple armature winding. The armature has 8 slots and 8 commutator bars. It is for a 2-pole field and the brushes are to be placed on the center line of the poles. All of this information is indicated in the illustration. The way in which the winding would be put on the armature also is illustrated. Starting at commutator bar 1, as marked, the winding goes to slot 1, then to slot 5, and continued in these 2 slots until the required number of turns have been wound. The end of coil 1 is then brought to commutator bar 2 from whence the winding goes to slots 2 and 6. When the required number of turns have been put in slots 2 and 6, the end is brought to commutator bar 3. This process is continued until there are 2 coil sides in each slot and the end of the last coil goes to commutator bar 1, where the winding started. This is the typical lap winding which is used in cases of this kind.

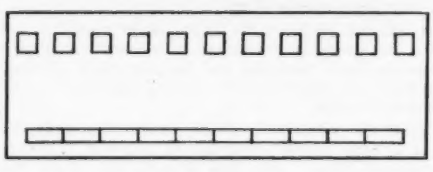


FIG. 2.

To get to the main part of this job, let us consider how to make a record of this winding which will give the required information in brief form.

Winding Diagram

Directions:

Procure a suitable card or sheet of heavy paper to make a layout such as shown in Figure 2. (This layout should have the dimensions given as shown in Fig. 3.)

Draw center lines on the card or sheet as shown, and mark off the horizontal spaces to represent armature-core teeth and armature slots. Measure down 1 in. from the horizontal center line and lay off the commutator bars as shown. (Sometimes the mica between

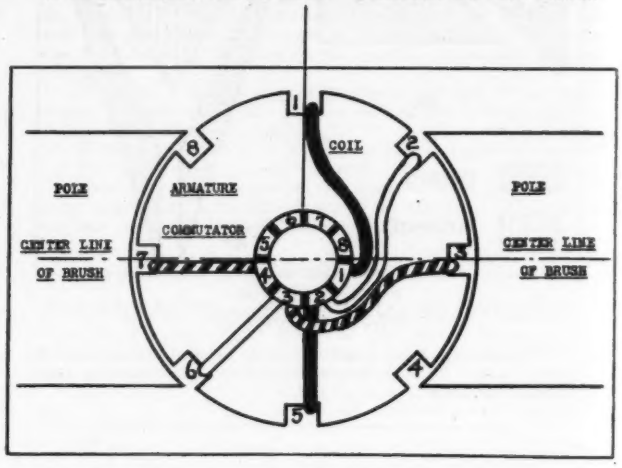


FIG. 1.

the bars is on the center line of the slots and sometimes it is on the center line of the teeth, so both types of layouts should be made for general use.)

Make the winding record similar to the one illustrated in Figure 4. Notice that the commutator bars are numbered to correspond with

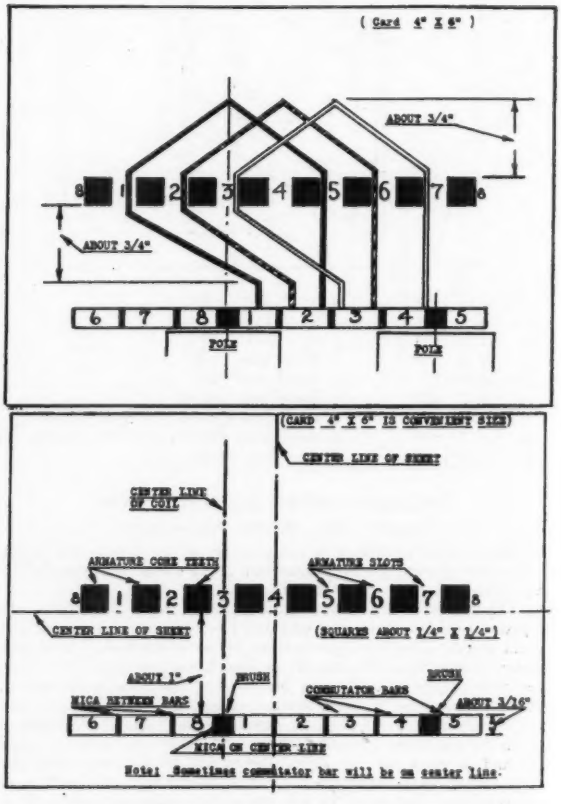


FIG. 4 ABOVE. FIG. 3 BELOW.

the slots shown in Figure 1; that is, the mica between bars 8 and 1 is on the center line of slot 3. Starting at bar 1 show the winding going to slot 1, then to slot 5, and back to bar 2. (The number of turns is not shown. This and other data is given on the back of the card.) Then from bar 2 the winding goes to slot 2, then to slot 6, and to bar 3. Two coils will be sufficient because all are put on and connected in the same manner.

WINDING AND CONNECTION TABLE

From Bar	To Slot	To Slot	To Bar
1	1		
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

(Leave space for more)

(Put data on other side)

FIG. 5.

FIG. 6.

If it is desired to show the position of the brushes and the poles, it can be done as shown, or in any other convenient way. The poles, looking at the ends, may be shown around the teeth of the armature core, if this can be done, and still leave the diagram clear.

Winding Table

It may be convenient and desirable to list the complete winding for the armature. If this is the case, a list may be made as illustrated in Figure 5. This list when filled out properly should check completely, ending with bar 1.

Figure 6 shows a picture of an armature from a repulsion-start induction motor with the winding partly removed for checking. Cards and tables such as described are for use in cases of this kind, where the windings are more intricate, as well as the simple windings suggested by the sketch in Figure 1.

GLUE CLAY—A USEFUL SHOP MATERIAL

J. Taylor Sawhill, Colorado Springs, Colorado

Owing to a demand for Italian clay projects in the shop, the writer experimented with various materials, and now uses the following method of making an inexpensive clay.

Mix a few ounces of powdered whiting with water until a tough dough-like putty is formed. Enough liquid glue is then slowly stirred into the mass until the clay is of the consistency of very thick paint. (Whiting may be obtained at any paint supply house for a few cents per pound.) This mixture adheres to wood, and dries with a rock-like hardness in a few hours. To apply it to glass, first coat the glass with a heavy varnish, and when thoroughly dry apply the glue clay. The varnish should be thickened slightly with whiting. Any unused clay can be kept from hardening by pouring some water over it which must be poured off without stirring when the clay is used again. Then enough whiting and glue must be added to restore the clay to the proper consistency.

A rough stippled effect can be obtained by patting the freshly clayed surface with a flat knife blade. A smooth clay-like surface is obtained by dipping the finger tips in a little water and rubbing the surface lightly. Three or four coats thinly applied will not crack. Do not allow the clay to dry too fast or surface cracks will form. When cracks or surface defects show up they can be removed by moistening the defective portion and working over it a thin paste of the clay. Ornaments in raised relief can be built up a little at a time.

This clay thinned with water makes an excellent sizing for woven projects of fiber cord. Used thick it is a good filler for dented wood surfaces which are to be painted, and for restoring damaged parts to art objects of plaster or wood.

Pine blocks 1½ by 4 by 5 in. high, covered with the clay make effective book ends. The design in the illustration is built up in clay and rubbed smooth with an orange-wood stick.

The pictures illustrated are first glued to thin boards, then waxed lightly with a good furniture wax and polished to a glossy surface. The clay is then spread over the built-up form which is made by fastening light wood strips to the board with brads. A board ¼ in. thick will need cleats across the back to keep the drying clay from warping the board out of shape.

A frame for an oil painting can be built up of pine and inexpensive moldings, then overlaid with clay. The writer has framed large mirrors and oil paintings in this way. A sawed or carved design in the wood will add a professional touch to the frame. A stipple treatment in an all-over pattern can be made really beautiful.

To frame a mirror make the frame first, then have a heavy plate-glass mirror (without bevel) fitted into the frame; apply the clay and allow it to dry to a putty-white before decorating. A gold paint mixed with banana oil is first applied. When this is dry an overtone of blue thinned with turpentine is put on, covering the gold. When the blue is flat or almost dry, it is patted lightly with a soft cloth allowing the undertone of gold to show up. The high lights can be touched on with the finger tip dipped lightly into gold paint or any of the copper-colored bronze paints. Any color scheme can be worked out by using the various bronzing powders sold by paint supply houses.

The artists' tube oil paints are thinned with turpentine for the overcasting colors. Dull brown or Roman gold was used in the candlesticks shown and the tulip design painted in dull gold over the raised pattern.

For the "aged" effects, a gray made by mixing black and white is used over the gold undertone.

Dull brass effects are made by using green over bright gold.

To mix the bronze powders to various tones put the two or more colors in an envelope and shake well before mixing with banana oil, thus green-gold, blue-gold, or violet-brown may be obtained.

The roofed frames have a pitch of about one-sixth or one-eighth. The gable overhangs $\frac{1}{8}$ in. at the front, and is made of a strip of wood $\frac{1}{4}$ in. thick. Avoid making the coping-saw decorations too deep or the corners may appear too prominent.

To apply the clay to a metal lamp stock, first coat the stock with heavy varnish and while still wet wrap the stock with a strip of muslin. When dry apply the clay to this cloth foundation.

The handles of hardwood paper knives can be made beautiful with this clay and the possibilities of rich coloring are unlimited.

Clock cases of thin poplar wood built to house tiny alarm clocks can be made to resemble real antiques by the use of this clay and the bronze paints.

The painter in oils can build up and decorate frames which if purchased would cost prohibitive sums. Pine moldings from the lumberyard may be used on these frames.

Good prints in rich colorings should be selected. Avoid hand-colored prints as the wax will blur the color.

SCHOOL SHOP ACCOUNTS

Ensel J. Hawkins, Fairmont High School, Fairmont, West Virginia

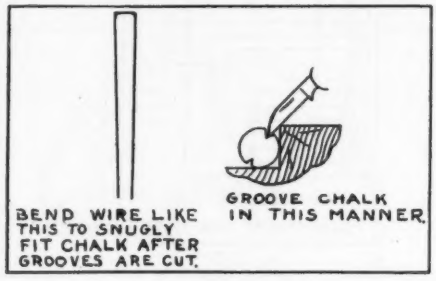
There are many systems used throughout the country for keeping accounts in public-school shops and laboratories. They vary from the small pocket account book carried by the shop instructor to the more elaborate systems of cashbooks, ledgers, cards, and filing cases.

The two cards shown herewith are being used successfully along with cashbook and ledger for recording individual accounts. The shop ticket is used when there is a set shop or laboratory fee. It is printed in a three-column form and by clipping one column, the shop ticket with receipt for $2.00 would remain, and then by clipping two columns, a $1.00 ticket with receipt would remain. The cards are also used with the bill-of-materials cards when materials are paid for before shop projects are constructed.

A CLEVER SHOP KINK

Frank W. Bentley, Jr., Missouri Valley, Iowa.

Chalk, when carried in the pocket for use at the machines in the shop breaks very readily. As a matter of fact, a new piece of chalk will often break when used for writing or drawing at the blackboard. To avoid this breaking, lay the new stick down along



some raised edge over which a knife-blade point can be passed to put two small grooves opposite each other in the crayon. Bend a piece of stiff wire as shown by the sketch, giving it considerable spring over the chalk at the ends. Slip this over the new stick. Now, even if the chalk breaks into several pieces by an accidental fall, it will stay snugly together. As the chalk is pushed forward

as it is being used, the pieces get all the tighter. This little device is by no means inconvenient, as it is only slightly longer over all than a new stick.

INDUSTRIAL ARTS DEPARTMENT
FAIRMONT, W. VA., PUBLIC SCHOOLS
BILL OF MATERIAL

Name..... Bench No.....
Project..... .....192....

Description	No. Pieces	T. W. Ft.	No. Units	Price	Total Cost	
			Total		$	
	Hardware, Finish					
			Total		$	

O. Ed., by Instructor. .....192....

INDUSTRIAL ARTS DEPARTMENT

Order No. ..... Class and Bench No. .....

Fairmont, W. Va., Public Schools .....192....

In Account With .....

One Shop Ticket, Value $..... Not Transferable

This Ticket must be left with the Instructor before the second week of the Semester. Upon settlement of all accounts with Industrial Arts Department, any unused portion of this ticket, when properly certified by the Instructor, will be refunded by the director. The value of this ticket is limited to the school year denoted by its date.

Certified for.....cents for redemption by the director.

.....192..... .....
Instructor

.....192..... .....
Received in full above refund Pupil

INDUSTRIAL ARTS DEPARTMENT

Fairmont, W. Va., Public Schools .....192....

RECEIVED FROM..... LAST AMT. $ 1 2 3

For Shop Ticket, Value $..... Not Transferable

Order No. ..... Director

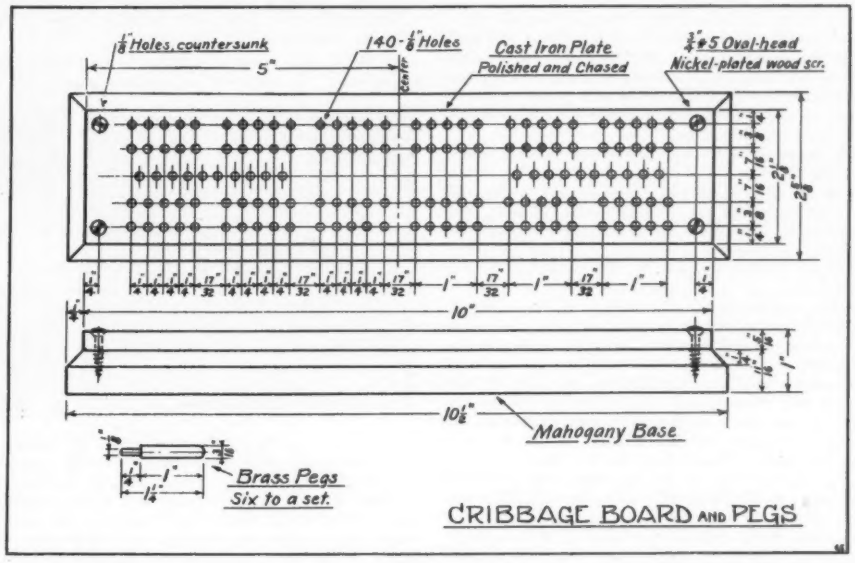
CARD FOR ORIGINAL BILL OF MATERIAL. MEASURES 4 BY 6 IN.

CARD FOR ORIGINAL SHOP TICKET. MEASURES 4 BY 6 IN. THE ATTACHED STUB MEASURES 1½ BY 6 IN.

CRIBBAGE BOARD AND PEGS

Wm. F. Guenter, Eveleth, Minn.

The plate is made from a piece of cast iron measuring ⅛ by 2⅛ by 10 in. After all surfaces have been given a finishing cut on the shaper, the holes are laid out on the plate. These are then drilled with a ⅛-in. drill, after which the plate is polished with a file or emery cloth. The surface can then be chased with a special tool or a hardwood stick and emery dust and oil, after which it is mounted on a walnut or mahogany base with 4—¾-in. No. 5 nickel-plated oval-head screws. Or 4 holes may be tapped on the underside of the plate with a 10/24 tap, care being taken not to drill through. The plate is then held from the bottom with 4—10/24 machine screws. A piece of felt is next glued to the back of the board to finish the job. The pegs are made from ⅛-in. brass rod, the large end of peg nicely rounded.



THE CIRCULAR COMBINATION SAW

George H. Whitaker, Colorado Springs, Colorado

One of the latest tools to claim the attention of the woodworking instructor is the planer, or smooth-cutting circular saw. This is not a recent invention. It has been on the market for several years, but it has not been widely known, nor well understood. The modern trend toward fewer and more efficient operations, coupled with a demand for saving time and material, point to the smooth cutter as a distinct improvement in many respects.

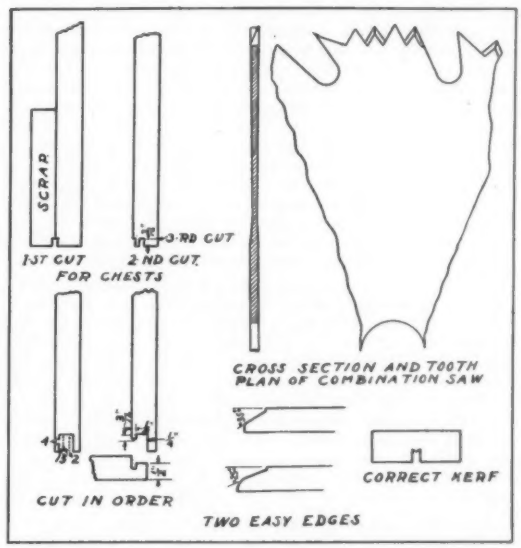
This saw is usually two gauges thicker than one of the same diameter in the regular styles, but the principal difference is in the grinding. The teeth are full thickness, and run without set, but the saw tapers toward the center, being ground three gauges thinner at the edge of the collar than at the teeth. For strength and rigidity, the part under the collars is left full thickness. The teeth are not set, but being slightly thicker than the body of the saw, cut a kerf through which the blade will run easily if care is taken not to allow the stock to bind. This saw comes with a variety of rip, crosscut, and miter teeth, but the most interesting, from the standpoint of the woodwork instructor, is the combination. In this style the saw is fitted with two or four crosscut teeth and one rip or raker tooth. The edge left in ripping cannot be surpassed with a jointer and the end cuts can be equalled only by the most painstaking work.

In the choice of teeth for this saw there is opportunity to fit the needs of the individual shop. For a double-mandrel saw we would recommend one rip and one crosscut as either of these will do a little faster work in its place than the combination. If only one is to be used the choice would lie between the two combinations as mentioned above with the odds in favor of the four-to-one combination, unless the work to be done is mostly ripping.

As this saw is a precision tool, more than usual care should be taken in mounting and fitting it. See that the mandrel runs perfectly true without the slightest end play, or straight lines will be impossible. The blade should fit the mandrel snugly, hang plumb in any position, and should not spring when the outside collar is drawn up with the arbor nut. Then line up the table with the mandrel so that the saw is parallel with the grooves in the table, and adjust the ripping fence, if necessary, so that it is exactly in line with the grooves. To get the most from the machine, the ripping fence should be accurately ground and set so that it is true in any position. When this has been done, run a board through the saw and test with a square. If the cut is not square, raise or lower the outer edge of the table with the adjusting screws until the cut is exactly plumb.

It is a good idea at this point to check up on the speed. The cutting speed of the smooth cutting saw is the same as that recommended for other saws, approximately ten thousand feet per minute. The saw will not do good work nor hold an edge if the speed falls much below this. The power required is practically the same as for a ripsaw, but it is well to see that the belts are tight enough to deliver all the power of the motor to the mandrel, yet not tight enough to waste power or to heat the bearings. It is a good idea, where boys are to use the saw, to leave the countershaft belt just loose enough that it will not stall the motor. Then if the saw is pinched or jammed it will stop, often preventing a dangerous throw-back or the burning out of a fuse.

In use, most of the general rules for other saws will apply. However, as the saw is running rather snugly in the kerf, there is a little more tendency to stick and burn than with the usual wide set. If the lumber is gummy, or shows a tendency to pinch, have a helper slip a small wedge into the kerf and spread the board as soon as the saw is cleared. Always push on the part of the stock that is passing between the saw and the ripping fence. Have a notched stick at hand with which to push the board through. Do not let the board come to a stop while on the saw as it will burn a little. In



crosscutting, hold the stock firmly against the crosscut gauge; use a clamp if necessary. If the board is too long for the operator to handle alone, let a helper support the end, but he must not attempt to help the operator push it through the saw as it is sure to bind. Neither may the operator push on the free end of the board. This rule must be impressed upon everyone and rigidly enforced if throwbacks and jams are to be avoided. All pressure exerted to push the board against the saw must be applied to the gauge and not to the board. It should also be an iron-bound rule, that the hand is never to approach the saw or pass by it, for a hand caught against the back of a saw is sure to be drawn into it and badly mutilated. Remember that a buzz saw is always dangerous, and the smooth cutter more so than any other because its ease of operation and great variety of uses invite taking chances with small pieces and fine work that would not be attempted with the ordinary saw.

In either ripping or crosscutting we discard the rules of overcutting, and of "cutting so that we can cut again," or of allowing for finish. Every cut is a finishing cut. This again invites the novice to take a chance by using the ripping fence to gauge the length when crosscutting. This must be discouraged, unless the fence is equipped with a crosscutting block, as the piece is very likely to jam between the fence and the saw, resulting in a ruined piece and perhaps a bent saw.

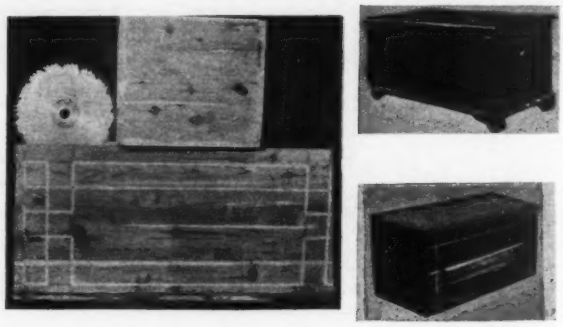
For cutting miters and bevels in the making up of columns, pedestals, etc., the smooth-cutting saw is without an equal. For work that is to be glued up and turned on the lathe, select edge-grain or quarter-sawed boards, being sure to get one straight edge on each piece. Then tilt the table to the required angle as shown by the protractor segment, and run through a set of test pieces. When the angle is exactly right, run the pieces to be used, cuttting the angle on one side of each piece. Then set the ripping fence for the required width and run them all again. Note that, for this kind of work, the fence must be on the left side of the saw; for if it is on the upper side the sharp edge of the bevel will run under the fence and the width will not be accurate. It is very necessary in this operation to keep the board pressed down tight to the table as it passes over the saw, or the width will vary and spoil the job. Pieces so cut will usually glue up at once, giving a very tight joint. If oak is used, however, and the cut happens to be at about the same angle as the grain of the wood, it will shatter a little, and will require a few light strokes of the plane to cut away the dead wood that has been exposed. For mitering picture frames and moldings, use the adjustable crosscut gauge. Set it with a square against the head, reading equal numbers on the inner edge of each blade where it crosses the tongue of the guide, and you will have no trouble getting exactly forty-five degrees, but the calibrations on the average saw-table equipment are not to be trusted. If the molding is of hardwood, or very large, always fasten it to the gauge with a clamp to keep it from slipping and spoiling the angle. A hand screw or clamp is convenient for this and can be easily handled with one hand if one grasps it by the handle rather than taking hold of the end of the jaws, leaving the other hand free to remove and replace the molding.

If your shop is not equipped with a shaper or molding cutter, the smooth-cutting saw will furnish several simple but pleasing edges and moldings. The edge on the dresser top shown in the accompanying illustration was obtained by tilting the table to thirty-five degrees. The fence was placed on the lower side of the saw and $\frac{7}{8}$ in. from it. The saw was raised until it cut to within $\frac{1}{8}$ in. of the farther surface and the piece was run through with the bottom to the fence. A pattern piece is run at the same time. Next, the table is lowered to horizontal and the fence set so that the outer edge of the saw is directly under the deepest corner of the bevel cut, and the saw raised until the corners of the cuts just meet. Run the pattern first to try it, and follow with the piece. A pleasing variation of this edge is obtained by rounding off the lower side edge with a plane.

Of course, the well-equipped shop will have grooving cutters, but the inlaying, grooving, dadoing, rabbetting and lock cornering can be done equally well with one of these combination smooth-cutting saws with the buzz saw. It will take a little more time, but the finished work will compare favorably. The two inlaid chests shown here were done entirely with this single tool, and were very acceptable when finished. The inlay in the smaller chest is just one saw kerf wide, which is in this case about a hundredth less than $\frac{1}{8}$ in. It is $\frac{1}{4}$ in. deep, is easier to handle, and more certain to stay put than the regular thickness. The larger job has $\frac{1}{4}$-in. inlays. Two cuts with the saw make the groove leaving a thin fin between which is enough to keep the saw cutting straight, and is easily removed with a chisel.

These chests are joined with a rabbet and dado. To get a good joint, always make a pattern from two pieces of scrap the same thickness as the pieces to be joined. Do not make up the entire pattern first; simply run each successive cut on the pattern before cutting the piece to be used. Set the saw $\frac{7}{8}$ in. high, and weight the handwheel so it cannot move. Run several cuts crosswise on scraps to test the tongues. Each cut is to be used as a gauge only once. Set the fence $\frac{1}{8}$ in. from the farther side of the saw; dado a pattern piece and then the sides. Move the fence to $\frac{1}{8}$ in. from the nearer side of the saw, and run the end pieces through edgewise for a sizing cut; pattern first, and outside to the fence. This is to gauge the thickness, as cedar prepared by hand is almost sure to vary in thickness. Do this job slowly or the saw will spring. To make sure, run in through a second time backwards, or clamp a piece of scrap to the piece to give the saw a full cut. Move the fence nearer by twice the thickness of the saw. Run the pattern again, and if the resulting tongue just fits a kerf, go ahead. Complete the rabbet with a crosscut, measure everything to see if it is right and put the joint together once—and once only. Trying it out is sure to weaken it, and may completely ruin the job.

The smooth cutter is a precision instrument, and must be cared for as such. It positively will not do good work if allowed to get



dull, or to be covered with gum from the lumber. Sharpening the saw is not a big job, but it must be done frequently. For the average use, a good filing once a week with a touching up once or twice between times may be sufficient, but if the machine is kept running most of the school day, it will probably need more than that. The extra work it does will well pay for the trouble, and it is useless to expect a saw to run without set, unless the teeth are kept sharp, and the face of the saw is kept clean. To file the saw, choose an 8- or 9-in. three-cornered file that will cover the teeth; and file it as you would a common crosscut of similar size. Have the saw in a filing vise that will not allow it to chatter. File with a straight even stroke being careful to give each tooth the same cut. Preserve the original slant of the tooth, and file only enough to reach the point. If one or two teeth are worn or dented lower than the others, do not file all of them down to that level, let them go until the next time. File the raker teeth on top with a small flat file until they are a little lower than the other teeth. There is no need to save metal on the rakers by filing on the under side for they will wear slower than the crosscut teeth anyway, and must constantly be lowered a little to keep them below the cutting level. When the saw is new you will notice that the end of the kerf is always convex toward the saw. If the kerf becomes flat, it is a sign that the rakers are too long, and are doing the work of the cutter teeth. In such condition the saw requires more power and does not do as good work. After filing the saw several times, it is a good idea to test the height of the teeth. If it is found that they are uneven, it is an easy matter to joint the saw, even without special tools. Reverse the motor, or turn the belt so that the saw will run backwards; lower the saw until the teeth are below the table; hold an oilstone firmly over the saw, and turn up with the handwheel until it touches the stone. A very little of this will suffice, and it is not desired to wear the saw any more than necessary. So again, if two or three teeth are a little shorter than the others, let them go; they will come up next time. Then after filing the crosscut teeth, be sure to reduce the rakers a little below the cutting level; a thirty-second is not too much to start with.

Lastly, do not condemn the saw if it gums up and stalls. It must be washed clean with warm water; a little soap and a chip to scrape with will help. Again, it is little extra work, but if you never allow a board to pinch the saw, and do not let your boys use it for a planer, it will not happen often. As we said before, the smooth-cutting saw is a little more troublesome but it is worth it.

METAL WORK

Alfred Grayshon, J. Cooke Junior High School, Philadelphia, Pennsylvania

There are numerous kinds of metal which have varied and extensive uses. Iron and steel are used when strength is wanted in an article, and we think of these metals first when strength is required.

The metal crafts divide up into many branches of skilled work, but they all have the same starting basis, namely, the initial knowledge one gets of the general uses of the different metals. Junior high schools introduce metal work to the boy by having him work with tin, annealed sheet iron, galvanized iron, sheet and bar copper, and bar steel.

The boy is taught to make projects which are useful or ornamental to the home. Part of the instruction is in the form of short

discussions illustrated by blackboard sketches, part is in the form of blue prints, and all is emphasized by a practical demonstration. As he progresses with the project he is expected to have each step checked by the instructor before he undertakes the next.

Upon first entering a metal class, the boy is told what metals he is going to use and their history. He next learns the technic of soldering and seaming tin, first through illustration and then by an exercise which he must do himself. He then begins to work on projects of sheet metal, each succeeding one being increasingly more difficult to perform. As the boy progresses further into the industrial-arts course, he learns to machine and work with iron, steel and copper.

This kind of work develops the boy's knowledge of tools, sense of proportion, knowledge of mechanical drawings, and appreciation of finished objects. He has encountered a material which is difficult to handle. It is also a dangerous one because of its sharp edges, and he learns to handle it carefully through his experiences. The limit of accuracy is quite small for metal work, hence his work in the metal shop helps him to develop accuracy.

If the boy intends to enter an engineering school, or if he desires to enter one of the metal trades, his experiences in the school metal shop help him greatly. But even if he does not make use of the knowledge which he gained in either of these two ways, he will retain at least part of the things that he learned at the school shop and he can utilize them in work about the home, or they may contribute to more profitable use of his leisure time.

AROUSING INTEREST IN SHOPWORK

William A. Brock, Boys' High School, Lancaster, Pennsylvania

When the author was informed on his arrival in Lancaster last September that it would be a part of his work to take five classes in continuation-school shopwork, he did not feel greatly encouraged. From a year's experience in that line, and from observation, he had found it rather difficult to arouse the interest among these boys with the usual methods and projects of the school shop. The individual project method did not prove satisfactory due to the one-hour-per-week period and, also to the lack of proper facilities in the five-days-per-week shop to store the unfinished work.

The psychology of the continuation-school boy differs considerably from that of the boy in the full-time school of the same age. The continuation-school boy in most cases is a producer and is self supporting. The large majority of continuation-school boys entering industry will become, through limited education and economic conditions, skilled or semiskilled workers, not mechanics. For these and other obvious reasons it would seem that the shopwork best adapted to the needs of the continuation-school boy would be that done with the methods used in industry.

Our idea was to make something on a production basis. Mr. Brunton, director of industrial education in Lancaster, was willing to give the idea a trial. Our first attempt on a "cooperative production" basis was a success. Starting in September the five classes made 186 toys which were given to the Welfare Federation to distribute at Christmas time. The boys and the instructor got quite a kick out of this job. Each boy had a particular job or operation to do, a foreman was chosen and as near as possible each boy was changed from one operation to another from week to week.

Each class chose the toy it made and the mechanical-drawing department of the boys' high school drew the plans. The metal parts for some of the toys were made by the continuation class of the West End Junior High School. When the job was completed, costs were figured up, and allowing the average wage per hour received by the group for their outside work, the boys found they had produced a better job for the same money than could be produced in industry.

Mr. Brunton next suggested that we make six workbenches by the production method for one of the grade shops. This job was hardly started when we were asked to make fifty tree guards for school use. Both of these jobs have been completed. Twenty drawing tables are now being made for the cooperative department of the Boys' High School. Through the community spirit developed in making these projects, the boys have received a very valuable lesson in civics.

THE PLACE OF APPRENTICESHIP IN INDUSTRIAL EDUCATION

Mr. Night, supervisor of apprenticeship training for the department of vocational education at Syracuse, N. Y., speaking recently on the subject of "Apprenticeship Training" before the local rotary club, said that "When we speak of vocation today, we are apt to refer to it in terms of the present and disregard the fact that back of it is a great social inheritance of knowledge, concerning studies, technical material, devices, and methods."

In the acquiring of knowledge relating to trades, Mr. Night pointed out that there are two methods. In one case, the learner may acquire the knowledge in the actual performance of the work, progressing from the simple to the complex under the supervision of the master. In another case, the knowledge is acquired during a definite period of instruction, where the learner is concerned with learning the processes and no consideration is given to the amount of work produced.

Mr. Night showed that, in the past, a boy might become a lawyer by serving as an apprentice to a practicing lawyer. From the beginning the boy made himself useful to the lawyer by taking care of the office, transcribing briefs, and acting as bookkeeper; he was expected to learn how to prepare briefs, to search titles, and plead cases. Today, the learner must attend a law school, where the methods and tricks of the trade have become highly organized, and where he acquires much more knowledge than he could possibly acquire while serving as an apprentice.

While much has been done for the vocations now termed professions, very little has been done for those called crafts. This includes the craft of the carpenter, the bricklayer, the plumber, the electrician, and the painter. Each of these workers learns the tricks of the trade and the application of the processes through contact with the other members of the craft with which he is connected.

Under the old apprenticeship plan, the apprentice spent a specific period in training under a master craftsman. This period usually consisted of seven years, and during this period the apprentice was in intimate contact with the master workman. He lived in his house, was clothed by him, and taught the trade. Today, this system is practically gone, and industry is confronted with the knowledge that a failure to train apprentices has decreased the supply of trained men. Under present conditions in industry, there is usually no one person responsible for the apprentice's education. He is frequently left to shift for himself in the belief that he will somehow acquire the necessary knowledge and skill of his trade. The training of apprentices must continue if there is to be an adequate supply of trained workmen for the future.

Apprentice training in the building trades is recognized as a problem of first importance by manufacturers, employers, labor, and building interests. Quality of workmanship, and a sufficient number of workmen are necessary to give an adequate outlet and satisfactory use of the materials and equipment used in building construction. Apprenticeship in its broader meaning includes such important factors as a knowledge of the dignity of craftsmanship and the fundamental principles back of apprenticeship training. The skilled workman is the contented workman and his labor is always in demand.

The movement for apprenticeship training in Syracuse was begun in 1924, in connection with a conference of business, labor, and educational leaders of the state at Utica. The following year the state builders' association meeting in convention at Buffalo, took up the matter of apprentice training. The local builders' association attacked the problem from the local viewpoint, with the result that an apprentice training commission was organized to establish a plan of apprentice training.

The commission which consisted of representatives of the building employers and employees, labor organizations, and educational authorities, made a study of the various crafts of the building trades to determine the number of apprentices employed in the trade, and the extent of the training provided. The results of the study revealed a distinct need for apprentice training, which led to the formation of joint apprentice committees, consisting of three employers and three employees of each trade concerned. These committees were given the duties of enrolling apprentices, placing them in school, organizing the training plan for the particular craft, inspecting courses, supplies, and equipment, selecting teachers, and determining the wage scale for the apprentices. Each craft organized its own joint committee, which committee after approval by the commission, requested the board of education to establish classes for the particular trade. Through the cooperation of the superintendent of schools, a building was obtained, funds were secured, and classes in stonecutting, bricklaying, painting, carpentry, and electrical work were established. Additional classes are planned so that eventually the building trades will be well represented by students enrolled in the several classes. A full-time supervisor is in charge of the work, who devotes his time to arrangement of courses, supervision of instruction, purchase of supplies, and supervision of teacher training. Syracuse is the first city in New York state to establish a daytime apprentice-training school, under a full-time supervisor, and the results have more than justified the experiment.

AN ACKNOWLEDGMENT

On page 51 of the February, 1928, INDUSTRIAL-ARTS MAGAZINE, we printed a short poem entitled "The Teacher." Not knowing the author we could not give him credit. Through the courtesy of Mr. Ernest J. Hooper, shop instructor at the Chrispus Attucks High School, Indianapolis, Ind., we have since learned that the poem was written by Mr. Leslie P. Hill, principal of the Cheyney Training School for Teachers, Cheyney, Pa.

Vocational Guidance in Rural Communities. Prof. C. E. Partch of Rutgers University, with the assistance of a committee of school officials, recently carried out a program of vocational guidance in Hunterdon county, N. J.

MR. RASCHE GOES TO PITTSBURGH

Mr. Wm. F. Rasche, formerly on the faculty of the Milwaukee Vocational School, Milwaukee, Wis., has recently been appointed professor of vocational education in the University of Pittsburgh. Mr. Rasche assumed his duties on February 1.

MR. WM. F. RASCHE
Professor of Vocational Education, University of Pittsburgh

Mr. Rasche was educated in the public schools of Milwaukee and had taken a special course at the Extension Division of the University of Wisconsin. Then came seven years of summer-school work leading to the degree of B.S. in 1925. He also completed a full-time residence course at the University of Chicago, receiving a master of arts degree in education. During the past year he had completed work leading to a doctor of philosophy degree. Mr. Rasche was for six years director of the Cudahy Vocational School. In 1922 he became a supervisor in the Milwaukee Vocational School, and a year later was appointed assistant director of the vocational teacher-training and research division under Mr. R. H. Rodgers.

In his new work at the University of Pittsburgh, Mr. Rasche will direct the courses in trade analysis, organization of industrial material, and other vocational-education activities.

MR. C. A. FULMER

Mr. Fulmer, for nine years director of vocational work in Nebraska, has had a varied educational career, ranging from principal of a village school, and superintendent of schools, to a member of the faculty at Nebraska Wesleyan University, dean, and chancellor of the University. His service at Wesleyan University was especially useful and worth while in meeting the students and dealing with their particular problems. His time was devoted to the education of youth—not merely schooling them but educating their hearts as well as their heads, developing an ability to think through things for themselves, an ambition to make use of their lives, not merely to spend them; a courage to believe that high rewards will repay high endeavor.

The latest and probably the most important work of Mr. Fulmer is that connected with the rehabilitation division of the state education department at Lincoln.

Vocational education in the schools has developed to a degree no less than marvelous in both city and country districts. This work follows the accepted routine, with a good bit of individual investigation added. For example, recently letters were sent to four hundred Nebraska high schools, asking for statements as to their choice of occupations, with the result that over forty thousand students sent replies. From these answers Mr. Fulmer will analyze the shifting trend in occupations, and will determine, if possible, why certain fundamental activities lack attractiveness, and why others are appealing. At first survey the agricultural activities seem to be gaining in popularity. This is gratifying in Nebraska, an agricultural state; and it is fairly claimed that the work in Smith-Hughes agriculture stimulates this interest, not only through full-time instruction, but through part-time classes, evening classes, and short-unit courses. Often father and son come together for instruction in branches relating to farm activities such as general farm management and poultry and dairy husbandry. A dozen branches of farm-machine repairing and operating are stressed—preliminary work which sets many a young man on his way to a technical course and which opens up to him through his local Smith-Hughes school.

Nebraska is rapidly becoming an important state in trades and industries, and the program of trade and industrial education has been expanded to meet the needs of those who wish to prepare themselves for trade or industrial pursuits, and for those who wish better training for work in which they are already employed.

Nor are the young women neglected. A few are interested in poultry and dairy husbandry, but larger numbers choose home economics, work leading to college courses, or a nurses' training school. A vision is given them of a course in home economics; not alone is teaching open to them, but there are branches of this training such as café, cafeteria and lunchroom operation, or the work of dietitian in a hospital. In the case of the graduate nurse, as close specializing may be done as by her degree-holding sister from the arts college. The X-ray field is wide open; the special nurse for anesthetics is in demand; the one preferring work with children never need look for employment; those with executive ability advance rapidly to positions as ward supervisor, surgical supervisor, head nurse and superintendent of nurses.

These lines do not exhaust the possibilities of further specialization for students developing talent through Smith-Hughes courses. Whatever the young man or young woman prefers may be carried along through some of the avenues opened therefrom. But at that, today perhaps the thing closest to Mr. Fulmer's interests, and it may be of greatest value

MR. C. A. FULMER
State Director of Vocational Educational, Lincoln, Nebraska

to the State of Nebraska, is the work with adults conducted through the rehabilitation division. The man of maturity, who is the victim of some catastrophe depriving him of earning power, loses his grip on life. Black discouragement means the death of initiative; and the man who might be trained in a new activity if only some one opened the way, becomes a dependent. Most of all, such a man needs a friend, one who

offers him aid and revives his courage simultaneously; who shows him that the future may be bright. This phase of his work Mr. Fulmer wishes he had time to handle himself, and much of it he does handle.

Mr. Fulmer is a graduate of Nebraska Wesleyan University, the University of Nebraska, and the Nebraska Baptist College, and holds degrees given by these institutions. He was dean of the College of Liberal Arts of Nebraska Wesleyan University from 1908 to 1910, and chancellor of the same institution from 1910 to 1917. In 1918 he was appointed state director of vocational education for Nebraska, with headquarters at Lincoln.—*Emily Guiwits.*

MR. HOSKINS ELECTED DIRECTOR OF INDUSTRIAL ARTS

Mr. James A. Hoskins, formerly at Lincoln, Nebr., was recently elected as director of industrial arts at Fort Collins, Colo. Mr. Hoskins assumed his new work immediately.

Mr. Hoskins is a graduate of the Chicago Technical College, and of the Colorado Agricultural College at Fort Collins, Colo. He has also completed special professional courses at the Iowa State Teachers' College, and the State College at Ames, Iowa.

MR. JAMES A. HOSKINS
Director of Industrial Arts, Fort Collins, Colo.

His practical experience was obtained in the woodworking department of the arsenal at Rock Island, Ill., and as inspecting carpenter at Great Lakes, Ill. He has had considerable school experience, covering three years of general teaching in addition to several years as a teacher and supervisor of industrial-arts subjects. He has been instructor in the woodworking and carpentry department of the Lincoln High School for the last year. Previous to that, he was instructor in shop subjects in the East High School at Waterloo, Iowa.

NEW BOOKS

Elementary Building Science

By Alfred Everett. Cloth, 160 pages. Price, $2.50. Oxford University Press, New York, N. Y.

The principles of chemistry and physics and their application to building design and building material are here explained. The text is a selection of material taught in a British school for builders and represents a type of work which will undoubtedly grow in United States as our system of vocational education is developed and our specialized courses are still further specialized.

The A B C of Plastering

By A. H. Telling with an Introduction by T. P. Bennett. Cloth, octavo, 236 pages. Price, $2.85. The Oxford University Press, New York City, N. Y.

The title of this book explains its arrangement and content quite aptly. It is a rather complete handbook of the materials and processes of modern plastering work and, at the same time, a dictionary of the terms used in plastering and in the allied arts, in architecture and building construction. The author is general secretary of the National Association of Plasterers, Granolithic and Cement Workers of England, and he naturally explains everything in terms of British practice and British nomenclature. The book will be useful in any American trade school not only for its content as a whole, but also as an interesting insight into the methods employed in a foreign country.

A Plan of Printing Instruction for Public Schools.

By Henry H. Taylor. Cloth, 36 pages. John Day Company, New York, N. Y.

The present book, which is sponsored by the American Institute of Graphic Arts, is based upon the assumption that printing as taught in public schools is faulty in aim and method and fails to meet the needs and opportunities of the day. And while the author is discreetly silent in what respects the aim, the method, and the content of printing courses fail, he is quite specific in his own proposal of aims and objectives.

Printing, he believes, must be entirely prevocational in scope and aim, and must provide the student with a general overview of the art. Familiarity with all the tools of the trade—type, paper, presses, etc.—must be provided, but skill in the trade sense need not and in fact should not be sought. The greatest amount of correlation with other subjects is to be sought by requiring the student (*a*) to edit and mark his own copy and read proof; (*b*) to prepare layouts with especial emphasis on design; (*c*) to set straight matter, with attention to spacing, leading, indention, etc.; (*d*) to lock up forms with emphasis on good margins, lining up, etc.; (*e*) to make-ready forms; (*f*) to properly ink and run forms on the press; (*g*) to learn and apply the mathematics of printers' measurements; (*h*) to learn the characteristics of the commonly used papers, inks, and colors; and (*i*) to study the history and literature of the trade. The matter provided in the shape of "copy" is to be carefully standardized and all students are to do the same jobs. The teacher is not to consider himself an instructor as such, but a guide and coworker who gives individual help where needed. The pupil is to be thrown upon his own resources quite as much as possible. The author has no specific outline to offer for the actual materials of a course and he makes no suggestions for time schedules.

There can hardly be a quarrel concerning the general thesis of the book and the recommendations which the author makes concerning the immediate prevocational and cultural objectives of printing. Every leading advocate of the subject in elementary and secondary schools has seen and stressed these values of the subject. Most supervisors and many teachers will also agree that a much higher level of training and efficiency on the part of teachers is to be desired and great improvement in the content of courses and teaching methods is essential. On the other hand, most teachers will hold that the author seems to very much overestimate the abilities of pupils in junior and senior high schools, that extensive study of the various phases of the printing art is entirely impossible in the limited time available, and that standardization of instructional materials, if ever desirable, is hardly possible without many years of further experimentation and experience. The chief value of the book, then, is the fact that it calls attention to widely appreciated faults and suggests the immediate need for improvement.

Laboratory Experiments in Practical Chemistry

By Newton Henry Black. Cloth, 188 pages. The Macmillan Company, New York City.

This is a revised edition of the author's book on the same subject published in 1920. The experiments, the author explains, are so arranged as to accompany the revised edition of Black and Corant's Practical Chemsitry.

The directions for the several experiments are at first quite detailed but are gradually abbreviated so as to leave more room for the students imagination and initiative. In arranging the studies, the author bears in mind the actual amount of work the student may successfully accomplish.

The text is chapterized into a series of experiments, amply illustrated, and accompanied with explanatory notes. The appendix enumerates the chemicals and instruments employed.

Standards and Specifications in the Wood-Using Industries

Miscellaneous Publication No. 79, 1927. Price, $1.50. Bureau of Standards, U. S. Department of Commerce, Washington, D. C.

This publication represents one of the rapidly increasing number of compilations of standards and specifications which the National Bureau of Standards is preparing for simplifying and unifying our manufacturing industries and for economizing the use of natural products and manufactured articles. The book contains a carefully prepared reprint of the standards and specifications which have been adopted by the leading associations and manufacturers of wood and wood products, including paper and paper products. Teachers will find the book valuable in carpentry and building classes, architectural drawing classes, and, in fact, in all woodworking shops. There is a vast amount of information on timber, grading of lumber, lumber sizes, and special uses of lumber. Minor subdivisions are devoted to sizes of moldings, furniture sizes, etc.

ASSOCIATION AND CONVENTION ACTIVITIES

THE NEW YORK SCHOOL CRAFTS CLUB MEETING

The February meeting of the School Crafts Club was held on February 18 in the Geneva Restaurant, New York City. Pres. R. F. Hemion who presided, opened the meeting by entertaining a motion that the three applications for membership be accepted by the club.

The next number on the program was an interesting paper on Glue. This paper was read by Mr. Jamer, although Dr. Lane, chief chemist of the Chicago plant of the Armour Glue Company, wrote it. Mr. Jamer, and Mr. Burbank, both of the New York office of the Armour Glue Company, answered questions on the manufacture and use of glue. Various samples of bone and hide glue were shown and their relative merits explained. Some of the high points in the discussion were:

Never permit glue to be melted in any vessel by the action of dry heat or direct steam.

Be sure that the dissolver is supplied with a water jacket.

Do not cook glue as it breaks down the fiber strength. For practical uses, various temperatures of 120 up to 150 degrees are recommended. Glue in solution is all that is required.

Unheated glue will not penetrate and penetration is the keynote of glue satisfaction. One out of every three batches of glue is underheated when used.

Avoid waste by evaporation. Tests of glue show that twenty per cent of the body of glue mixture is wasted by evaporation. This causes a waste in the form of scum and rust.

The last part of the program was divided into two round-table discussions. One of these was on sheet metal work, by Mr. Edwin Ganong of Nutley, N. J., and Mr. C. Dudley Moore. Mr. Ganong gave a description of the work he has done and also demonstrated some of the models which attracted considerable interest on the part of the members. The other round table on wood working was conducted by Mr. S. F. Small, Union City, N. J. Mr. Small demonstrated through drawings and photographs, the successful work he is turning out in the form of lamps, smoking stands, nut bowls, and candlesticks. Mr. R. F. Hemion of Paterson, N. J., displayed some turned and carved problems suitable for high-school shopwork. He demonstrated how wood turning can be made more attractive by the use of a few simple lines with a vaneing tool and gouge. The models created a good deal of interest and were the subject of much discussion.

Thirty-seven members attended the meeting.—*H. S. Fletcher.*

VOCATIONAL EDUCATION SOCIETY OF BOSTON

Wesley A. O'Leary, assistant commissioner of education for the state of New Jersey, was the principal speaker at the meeting of the Boston Vocational Education Society on February 25. The largest number of members and guests recorded at a monthly meeting was present at the Hotel Westminster, Copley Square.

Mr. O'Leary took as his topic "What Every School Man Ought to Know." He amended the topic by adding the qualification "At Sixty"; for he was not sanguine enough, he said, to expect that most teachers would attain the desired knowledge very early in their careers. He confessed that he himself could not have spoken with authority or assurance upon the topic a few years ago.

The prime requisite which every vocational teacher ought to know in order to function with effectiveness, is what vocational education is. That in turn implies knowing what education is.

There is no dearth of definitions of education, said Mr. O'Leary. But definitions which won acceptance in the past are outworn and inadequate today. There is a constantly changing conception of education; naturally so, for it is a vital, live, growing thing.

At one time education was a system of training calculated to produce gentlemen. The great English "public schools" of Rugby and Eton, and many similarly conducted schools in this country, have as their goal and their perfect product the "gentleman." The speaker did not describe exactly what constitutes a gentleman, though he did point out that merely superficial qualities are sometimes taken as the distinguishing marks, and accepted as evidences of the type of education cultivated under this theory. He referred to a case in the newspapers, of an unidentifiable woman found unconscious near an eastern city, who was described by a reporter as being "evidently a woman of culture and education." Mr. O'Leary was rather impressed by the deductive powers of the reporter, whose reason was "that she was well dressed, and her hair had been recently marcelled!"

Another theory of education which had its rise and its period of acceptance, is the "information theory." The acquiring of information is the great and sufficient end of scholastic training. Even vocational education had been affected by the prevalence of this idea. A majority of printed school textbooks are based upon this theory. Yet, the sum total of information which the individual needs in order to live usefully and happily is comparatively small, after all. Much of the mere information which all of us acquire during our school life, we forget later without missing it very badly.

The doctrine of mental discipline is a hard one to down. Teachers of mathematics, in particular, defend this as the end of education. The discipline of mathematical study trains the pupil in that exactness, that accuracy which is demanded by life, which he can presumably acquire in his formal schooling, and apply later and elsewhere. This too, is an unsatisfactory theory of education.

The spiritual, or esthetic, aim of education next came under discussion. Mr. O'Leary told of an old negro who had a habit of wandering alone in the woods with his violin tucked under his arm. A curious person who followed him, discovered him playing wonderful music with no audience. The negro, on being asked why he did it, replied: "I'm saluting my own soul." Truly, learning to salute one's soul is something which a functioning education should not neglect. But, as a complete end of education, the spiritual aim is not sufficiently definite, nor sufficiently inclusive.

Mr. O'Leary painted a word portrait of a young man whom he had known, to illustrate the many-sidedness of his life. This illustrative man was typical of persons whom we all know; typical, in fact, of most of us. We have, as he had, an occupational life with its responsibilities; we have a religious life; a civic life; a family life; a leisure life. Education must look to developing intelligence in all of these diverse fields. No theory of education which omits one or more of them, can be accepted as valid today. In some of these phases of life the school has not hitherto been looked upon as having primary responsibility: in the religious aspect, for instance. A tendency of the time, however, is to look more and more to the school.

Thus, every schoolman at, or before, the age of 60, should know and appreciate these various aims which education must serve; even though his own service may be involved with only one of the compartments. These phases are not, as a matter of fact, compartments, with the mutual exclusiveness which that word implies, but they overlap into one another.

It is, of course, with the occupational phase of life that we as vocational educators are chiefly concerned, said Mr. O'Leary. Society demands of vocational education that it turn out individuals who are vocationally efficient. A man in a trade is expected to have manipulative skill, technical knowledge, and trade judgment. These should be habitual with him. Besides these, he should have that deep pride of craft which, in medieval times, led the guilds to punish spurious workmanship. In developing these habits and this pride, the vocational school has perhaps its most obvious responsibility.

But "no man liveth of himself, and no man dieth of himself." We are interdependent and related: economically, industrially, socially. If the school does not develop social insight, it will not turn out graduates equipped and ready to take their places among men.

Finally, the young man leaving the school is poorly equipped unless he possesses that most important thing of all, character. Without honesty, every wheel in industry would have to stop turning; every store would put up its shutters and lock its doors. For the training of character the vocational school has a responsibility. The school should not attempt to fulfill it by preaching, nor by direct instruction, but somehow it must achieve it.

Mr. O'Leary concluded with the hope that at 60, we shall all come to see what education really is, and to shoulder our responsibility as teachers, to the end that we may have not merely skilled mechanics, but men and women developed to the highest degree of which they are capable.

President Babb called upon Dr. Frank M. Leavitt, assistant superintendent of schools of Pittsburgh, Pa., to greet his many Boston friends and to relate a few reminiscences of the early progress of manual training and prevocational work in the Boston schools. —*Frederick Ames Coates.*

THE TULSA MANUAL-ARTS CLUB MEETING

The seventh monthly dinner meeting of the Tulsa Manual-Arts Club was held on February 8, at Tulsa, Okla., with Prof. R. W. Selvidge of the University of Missouri, as the guest and speaker of the evening.

Speaking on the subject, "Some Problems of the Shop Teacher in the Junior High School," Prof. Selvidge pointed out that a teacher must know specifically what he wishes to teach his pupils. He should endeavor to have his pupils know what it is that he expects of them during the semester. He should also let his pupils know what he does not want in technical and disciplinary matters. Prof. Selvidge related an experience he had with a printing teacher in the working out of a chart for correcting faults in technic and behavior. A progress chart was evolved, with space along the top for the names of the pupils, and another space down the sides for lists of faults or misdemeanors. The chart was used to list all errors committed by the pupils and it also constituted a record of the pupils' standings in class. The chart was very successful in pointing out the faults of the pupils and stimulating them to greater efforts.

Besides the members of the Tulsa staff, there were a number of visitors from other neighboring cities. Mr. P. S. Wheeler, Mr. Charles Henderson, and Mr. H. P. Adams were present from Bartlesville; Mr. R. C. Bowman, Mr. W. H. Coppedge, Mr. E. U. Opfell, Mr. R. A. Wells, Mr. J. P. Norris, Mr. O. J. McCollom, and Mr. Raymond Newman were present from Okmulgee; Mr. F. M. Dorsey from Jenks, and Mr. D. M. Roberts from Red Forks.

Announcement was made of an offer by the Cosmopolitan Club of Tulsa to sponsor a plan for giving prizes to pupils doing the best work in mechanical drawing, electricity, and metal work. The prizes will be five in number and will be of a rather substantial character, such as drawing instruments, tools, or books. A committee of three was appointed to work with the Cosmopolitan Club in working out the details for the contest.—*J. W. Bollinger.*

TENTATIVE PROGRAM OF EASTERN ARTS ASSOCIATION

The Eastern Arts Association has announced the tentative program for the annual meeting of the association, to be held April 18-21, at Hartford, Conn. Mr. Theodore M. Dillway, president of the association, will preside.

Wednesday Evening, April 18

Addresses of Welcome—Mr. F. H. Wish, Jr., superintendent of schools, Hartford, Conn., and Mr. A. B. Meredith, commissioner of education of Connecticut.

Address—Mr. Ernest W. Butterfield, state commissioner of education of New Hampshire.

Address—Dr. Bruno Roselli, Vassar College.

Thursday Evening, April 19

Salient Trends in Vocational Education—Mr. R. O. Small, state commissioner of vocational education in Massachusetts.

The Art of Etching—Mr. Emil Fuchs.

Address—Mr. Rollo G. Reynolds, Columbia University.

Friday Evening, April 20

Report of the Federated Council on Art Education.

Address—Mr. Robert J. Leonard, Columbia University, New York, N. Y.

Art and the Business Man—Dr. Henry Turner Bailey, director Cleveland School of Art, Cleveland, Ohio.

Saturday Morning, April 21

Industrial Education and the New Democracy—Mr. A. B. Mays, University of Illinois, Urbana.

Art, Education and Industry—Mr. Gerrit A. Beneker.

Art Section: Thursday Afternoon, April 19

Making the Drawing Lessons Effective—Mr. A. H. Wentworth, director of art, New Haven, Conn.

Finding Art in the Clouds with a Camera—Mr. James F. Barker, assistant superintendent of schools, Rochester, N. Y.

High-School Design Work in Relation to the Business World—Miss Florence E. Newcomb, Harren High School, New York, N. Y.

Friday Afternoon, April 20

America Takes Her Place in the Field of Design—Mr. Alon Bement, director of the art center, New York, N. Y.

Research Problems in Art Education—Miss Amie Doucette, State Teachers' College, Edinbor, Pa.

Beauty as the Motive for Excellence in Schoolwork—Dr. Henry Turner Bailey, director Cleveland School of Art, Cleveland, Ohio.

Manual Arts and Vocational Section:

Thursday Afternoon, April 19

The New Apprenticeship—Mr. J. Edward Goss, Brown & Sharpe Mfg. Company, Providence, R. I.

Continuation Schools—Mr. Ralph W. Babb, Lynn Continuation Schools, Lynn, Mass.

Woodwork in School Shops—Mr. Willis B. Anthony, State Normal School, Fitchburg, Mass.

Friday Afternoon, April 20

The Trade School—Mr. Herman Hall, principal of the Trade School, New Britain, Conn.

Manual Arts in Junior High Schools—Mr. M. W. Murray, director of vocational education, Newtonville, Mass.

Training Teachers for the General Shop—Mr. Harry E. Wood, director of vocational education, Indianapolis, Ind.

Home-Economics Section: Thursday Afternoon, April 19

The Changing Home-Economics Program—Mrs. Annie Robertson, Teachers' College, Columbia University, New York, N. Y.

The School Lunch as an Educational Service—Miss Margaret Edwards, American Child Health Association, New York, N. Y.

Friday Afternoon, April 20

New Attitudes Toward Homemaking—Mrs. H. A. Burnham, of the General Federation of Women's Clubs.

A Method of Determining Essential Subject Matter—Miss Alice Haley, formerly state supervisor of homemaking education in Minnesota.

EDUCATIONAL EXHIBITS AT THE EASTERN ARTS ASSOCIATION MEETING

The local convention committee at Hartford, Conn., has issued information concerning the educational exhibits at the forthcoming convention of the Eastern Arts Association, to be held April 18 to 21, at Hartford, Conn.

A total of 50,000 sq. ft. of floor space, the largest ever used by the association, is available for exhibits at the 1928 meeting. The large space available makes possible a display of exhibits never before paralleled in the history of the association. Besides special features depicting art in everyday life, it is planned to exhibit schoolwork from all parts of the United States, Mexico, and Europe.

The American exhibit for the Sixth International Art Congress at Prague will show in graphic form the most progressive features of art education in America. This exhibit will be located in a court of honor, and will be surrounded by groups representing work from the important educational institutions of the country, from schools teaching art education, and from teachers and supervisors who hold a high position in the profession.

In the members' professional exhibit will be found the work of the association members. There will also be shown exhibits of craft work, jewelry, pottery, batik, block printing, and other forms of industrial art.

The educational exhibits will comprise work from the elementary, secondary, normal, vocational, and trade schools, in addition to work from the college art departments, the museum educational departments, art schools, and evening schools.

Information concerning the exhibits may be obtained by writing to Mr. Joseph Wiseltier, general chairman of the local committee on arrangements, Hartford, Conn.

PENNSYLVANIA VOCATIONAL ASSOCIATION HOLDS ANNUAL DINNER

The annual dinner of the Pennsylvania Vocational Association was held at Lancaster, with 210 vocational and practical-arts teachers and superintendents of schools from Pennsylvania and nearby states in attendance. Addresses were given by Mr. G. E. Schulz, of the Armstrong Cork Company, Lancaster, and by Dr. Albert L. Rowland, superintendent of schools in Cheltenham township.

The regular business session followed the dinner, at which the following officers were elected for the year 1928:

President, Dr. G. D. Whitney, Pittsburgh; vice-presidents, Mr. E. R. Gehr, Imperial, Miss Margaret Glossner, West Chester, and Mr. G. H. Parkes, Williamsport; secretary-treasurer, Mr. C. E. Hedden, Harrisburg.

The association reported the largest membership in its history. It was decided to start a campaign to secure a membership of 1,500 persons for the next year. The association will actively cooperate with the local Philadelphia committee in the arrangements for the convention of the American Vocational Association to be held in Philadelphia next December.

PENNSYLVANIA VOCATIONAL AND INDUSTRIAL TEACHERS MEET AT LANCASTER

The industrial and vocational sections of the Pennsylvania Education Association met December 28 and 29 at Lancaster, Pa. The banquet on the second day was attended by 210 persons. Mr. G. E. Long, of the Armstrong Cork Company, gave an interesting talk, in which he described the apprenticeship system of the Armstrong plant. Other speakers on the program included Dr. J. A. H. Keith and Mr. Albert Lindsay Rowland. Mr. E. R. Gehr acted as chairman.

The nominating committee in presenting its report, showed that Dr. G. D. Whitney had been elected president; Mr. C. E. Hedden secretary-treasurer.

The industrial section reported that Mr. W. J. Groeschke had been elected as president, Mr. Darle Hess vice-president, and Miss Anna J. Wassner, secretary.

The vocational sections reported an enrollment of 450 members for this year.—*G. C. Donson.*

Courses in Concrete Construction. The construction of septic tanks has been begun as a part of the short courses in concrete in the Maine high schools which teach agricultural science. In addition to instruction on the building of these tanks, the boys are taught bacteriological and chemical principles governing their operation.

Pennsylvania Printing Teachers Organize. A printing-teachers' association has been organized in Pennsylvania, which is affiliated with the Pennsylvania Vocational Association and the American Vocational Association. The purpose of the association is to bring about greater unification among the printing teachers of the state, to afford a greater opportunity for an exchange of ideas and information, and for the consideration and solution of common problems.

The association will shortly hold a meeting at Altoona, at which time there will be adopted a constitution and by-laws. Information concerning the work of the association may be obtained by writing to Mr. R. L. Neigh, of Harrisburg, or to Mr. C. J. Romig, Altoona High School, Altoona, Pa.

Pittsburgh Industrial-Arts Association Holds Meetings. The Industrial-Arts Association of Pittsburgh has a large and active organization. The association holds monthly meetings, with a dinner followed by a definite program. Speakers of national reputation in vocational education are regularly secured for addresses at these meetings. The association has its own male chorus and frequently sponsors a dance or a card party. Mr. M. E. Swango, of the Allen School, Pittsburgh, is president, and Mr. L. W. Richards, of the Langley High School, Pittsburgh, is secretary.

NOW, ARE THERE ANY QUESTIONS?

Model Boat Building

744. Q.: Can you give me information regarding material on model boat building?—P. S.

A.: The three leading magazines on model boat building are *Motor Boating*, published by the International Magazine Co., 119 West 40th St., New York City; *Yachting*, published by Yachting, Inc., 25 West 43rd St., New York City; *Popular Science Monthly*, 250 Fourth Ave., New York City. Other good publications are *Science and Invention*, 230 Fifth Ave., New York; *The Model Maker*, 120 Liberty St., New York City, and *Popular Mechanics*, Chicago, Ill.

Some publishers of model boating books are The Rudder Publishing Co., 9 Murray St., New York City; Forest & Stream Publishing Co., 9 East 40th St., New York City; Spon & Chamberlain, 120 Liberty St., New York; Funk & Wagnalls Co., New York City; and Charles Scribner's Sons, New York City.

Refinishing an Old Table

759. Q.: I have a Sheraton spindle-leg table which is over 200 years old, and I wish to refinish it. The table had been stained or varnished so the inlay was covered up. I have scraped the table and found the top is burl mahogany, while the front and side rails are walnut veneer. How can I restore it to its original state?—*K. W. N.*

A.: First, sand the entire piece with a 4/0 paper, then dust it off, and give it a light sponging with clean water, to raise up any dents or rough grain. This may also cause loose spots in the veneer to raise as blisters. Mark their position with a piece of chalk, split them with a safety razor while still damp, and force hot glue under the raised blister with a piece of tin. Then cover the spot with a piece of white paper, place a smooth block over it and clamp it down. Let the glue set 24 hours. Resand all parts with the paper which was used in the first sanding operation, and which had been saved for this second sanding. Previous to the second sanding, all repairs such as burning in colored shellac, putty-glazing with plastic wood colored with dry colors, should be made in order that the last sanding may put all parts in perfect shape for the finish. Next, cut in all inlay lines with a fine striping saber brush filled with white shellac reduced one half with denatured alcohol. Do not let any shellac lap over on the mahogany or walnut. In case this does happen, it must be cut away with a split 6/0 garnet paper. The work is now ready for the staining which should be done with water stains only. Use a weak solution of mahogany stain, preferably antique, for the mahogany; and for the walnut use a walnut water stain or one for brown mahogany running not more than two ounces of stain per gallon of hot water. Apply the stain and let dry 24 hours. After the stain has dried, apply a sizing coat of white shellac diluted one half with denatured alcohol. Let dry five hours or until hard and then sand very carefully with used 6/0 paper to a glass-smooth surface. Dust off and fill with medium chocolate-brown silex filler, wipe clean, and allow to dry for 48 hours in a warm room. Dust off, wipe with a tack rag, and apply a well-brushed-out coat of the best floor varnish obtainable. Allow three days or more before sanding with a split 6/0 paper for the next coat. At least three coats should be given, the last dried one week and rubbed with felt pad, FFF pumice stone and water, until level and free from all dirt nibs. It may help considerably to keep out the latter if the varnish is picked at the time of application. Cook a tablespoonful of varnish in a tin cup with an ounce of brown resin until the whole is completely blended, allowed to cool to a very stiff mass. Shape a small amount of this composition into the form of a ball, and attach it to a fine wire about 6 in. long. Wet the ball with saliva and then touch it to the wet varnish over the speck of lint or dust. This will adhere to it and can be lifted out, the varnish flowing back again. If it is desired, the work may be rubbed with crude oil, purchased in any drug store. If water-rubbed it will be necessary to clean up with an oil polish. Leave in a semigloss. —*Ralph G. Waring.*

Finishing Metal Book Ends

761. Q.: I am molding designs and letters for book ends from lead. Could you advise any quick-drying, attractive finish for such work?—*H. W. M.*

A.: I should like to suggest the use of metallic bronzes in finishing your book ends. First, I believe that it would be best to copperplate the metal. Wash the latter thoroughly in a strong solution of washing soda; rinse in clean boiling water, then immerse in a saturated solution of copper sulphate made by dissolving a pound of "blue vitriol" in a gallon of water. To speed up the work of solution, suspend the copper sulphate in a bag at the surface of the water, in which case the very heavy solution will fall very quickly to the bottom of the container which should be a glass jar. Connect up a few dry batteries in "series parallel." Lead a wire to the lead casting from the negative (zinc, or outside) binding post, and from the positive (carbon, or central) binding post, lead a wire to a strip of copper and immerse both the casting and copper strip in such a manner as to have both covered and some distance from each other. In practice a smoother coat will be deposited if the copper strip is inclosed in a cloth bag. I believe that half an hour will be sufficient to complete the coating of sufficient copper on the lead. To obtain an antique copper effect the casting should be buffed to a polish and then dipped in a weak solution of hydrogen sulphide. In this manner the depth of brown-to-black effect can be controlled, by watching the process carefully. To obtain a statuary bronze effect, a partial buffing, should be given, followed by stippling the surface with a sponge dipped in a mixture of the copper sulphate slightly acidulated with sulphuric acid. Be sure to pour the concentrated acid slowly *into the water* solution of copper sulphate. Allow the stippled work to stand until the green effect has developed sufficiently, after which wax the whole piece and bring to a bright polish. The metallic bronzes may be brushed on the first copperplate coating, stippled to allow either the buffed or sulphided copper coating to show through. If bronzes of different colors are used and applied with one of the hand sprayers for applying lacquer, many beautiful effects are easily attained. To obtain smutted effects, wax the surface, let dry and apply rottenstone after which buff up with a handful of soft rags. Colors may be mixed with the wax to secure other shaded effects as well. Last of all, the new brushing lacquers may be used over the copper coat, sanded or buffed through to allow the new or old copper to show through, or any other of many fine effects which these ideas may suggest to you.—*Ralph G. Waring.*

Crackled Lacquer Finishes

768. Q.: I would like to find out if it is possible to make a crackled lacquer finish by using lamp-black as a base.—*M. McC.*

A.: While it is possible to make up a crackle finish in the home shop, it is not advisable, since the conditions necessary are rather tricky to control. What is necessary, actually, is a hard and quite inflexible material used as a top coat, over a much softer and slower-drying base coat. The difference in expansion factors causes the top film to rupture, and to expose the lower. Rather than give you a method which would probably be difficult for you to carry out because of lack of materials, I would suggest that you write to your preferred paint supply house and have them send you the colors you desire in crackle goods, specifying brushing materials in case you have no spraying machine. I might mention that crackle finishes are very much "out" with designers this year and have not been shown at the exhibits, thereby evincing a material lack of interest by the buying public.—*Ralph G. Waring.*

Inlaying and Inlayed Designs

769. Q.: Will you kindly give me some references on inlaying and inlayed designs?—*N. B.*

A.: The following references taken out of past issues of the INDUSTRIAL-ARTS MAGAZINE may be found helpful:

Inlaying: "Inlaying as a Shop Project," Jan., 1916, p. 5; "Veneering and Inlaying," April, 1917, p. 152, and June, 1917, p. 240; "Inlay Applied to Turned Work," June, 1919, p. 211; "Finishing Inlaid Furniture," Feb., 1920, p. 88.

Inlay Designs: "Inlaying Boxes in Maple," Dec. 1922, p. 506; "Mahogany Sideboard with White Holly Inlay Design," Oct., 1924, p. 397; "Inlaid Sewing Box," Oct., 1927, p. 395.

Shop Invoices

775. Q.: Can you tell me the issue of the magazine in which you published a form for taking care of shop invoices?—*C. L. E.*

A.: The shop record system was published in the March, 1927, issue, on page 115.

Piano Truck

778. Q.: It is my task to make a portable truck for a grand piano to be used in the auditorium. Can you help me with any suggestions or drawings?—*H. C. R.*

Can any of our readers furnish a sketch or drawing of such a truck?

Bending Chair Rockers

780. Q.: Will you kindly give me some information about the process of bending wood for chairs, rockers, etc.?—*E. E. A.*

A.: You may find information on bending chair parts on page 208, of the May, 1922, issue of the INDUSTRIAL-ARTS MAGAZINE.

A handy steaming outfit which can be made in the school shop is described on page 158, of the April, 1918, issue of the same magazine.

Stanley
Tool Catalog No. 34

Use these Catalogs as reference books for shop equipment

Stanley Catalog No. 34 should be in the hands of every manual arts supervisor and instructor. It lists and shows pictures of over 1500 items and gives detailed drawings showing their construction and adjustment. It also contains a reference for repair parts.

Other catalogs of Stanley Tools are illustrated. Stanley-Atha Catalog No. 25 shows a line of metal-working tools. Catalog No. 26 shows a line of tools for the automobile shop.

If you haven't all these catalogs in your file, let us send them to you. You will find them of help in making your list for the coming school year.

Stanley-Atha
Catalog No. 25

Stanley-Atha
Catalog No. 26

THE STANLEY RULE AND LEVEL PLANT
Educational Department, New Britain, Conn.

STANLEY TOOLS

STANLEY TOOLS

See the Point?

Some people think the point of a drill is the extreme tip of the cutting end!

Actually, that extreme tip is known as the "Dead Center"—while "The Point" is the *entire* cone-shaped surface at the cutting end. All that you see in the illustration above is "The Point."

This is only one of the many interesting and instructive definitions to be found in the Handbook for Drillers. In it every part of a twist drill is clearly and simply described—plus a great deal of useful information on grinding, cutting speeds, feeds and how to secure the best results when drilling in various metals.

Vocational Directors and Instructors are invited to ask for copies of the Handbook, in any reasonable quantities, for the use of their machine shop classes.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK-CHICAGO-LONDON

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

Manufacturers of Carbon and Cle-Forge High Speed Drills for every purpose; "Mezzo" Super-Carbon Drills; Hand, Jobbers' and Shell Reamers; "Peerless" High Speed Reamers; "Paradox" Adjustable Reamers; "Quick-Set" Reamers "Spirex" Machine Taper Pin Reamers; Chucking Reamers for Turret Lathes; Counterbores; Countersinks; Sockets; End Mills; and the "Exy-Out" Screw Extr

PERSONAL NEWS NOTES

Mr. Herbert Bast, instructor of upholstering at the Sheboygan Vocational School, Sheboygan, Wis., has been appointed to teach a course in upholstery during the summer session at Stout Institute.

Mr. Robert W. Tarbell, assistant in the teacher-training division of the Milwaukee Vocational School, will conduct courses in vocational education at the University of Wichita during the 1928 summer session.

Mr. M. C. Ritter has been appointed principal of the Central Evening Needle Trades School, New York City, and Mr. C. M. Smith as director of vocational investigation, guidance, and placement.

Mr. Joseph B. Funke has been appointed president of the vocational board at LaCrosse, Wis.

Mr. M. M. Krieps and **Mr. J. C. Meyett** have been appointed as members of the vocational board at Superior, Wis.

Mr. A. E. Steves and **Mr. H. C. Neumann** have been appointed as members of the board of vocational education at Oshkosh, Wis.

PUBLICATIONS RECEIVED

Report of meetings of the supervisory force of the Western Tablet & Stationery Company with the state supervisor of industrial education, St. Joseph, Mo. The meetings were held in the cafeteria of the firm's plant at the close of the working day and were intended to provide the group members with the benefits of a discussion of the production problems. It was also the purpose of the state officials to demonstrate to the firm, and to other industrial concerns, their willingness and their ability to assist in working out some of these problems. At the conference considerable attention was given to the foreman's job in the capacity of supervisor, manager, and instructor.

Cleanliness: A List of Recent Publications. Issued by the Cleanliness Institute, 45 East 17th St., New York, N. Y. The list of publications includes such material as may be found in the library of cleanliness institute and in neighboring libraries. The library of the institute has collected and made available a wide variety of types of material on cleanliness which will be available for public reference.

Advantages of Short-Unit Industrial Courses Stressed at Kansas State Teachers' College. The Kansas State Teachers' College at Pittsburg recently issued a circular in which it stressed the advantages of short-unit industrial courses as against the former long-period course. In the circular, the College commented on the new plan of the State Board for Vocational Education relating to the short-unit course and on the recent bulletin of the Federal Board for Vocational Education governing short-unit instruction courses. The study concludes with the statement that the short-unit course fills a present need, that it saves the time of the worker, that it thoroughly instructs him, and when well planned, makes it possible for the student definitely to progress in his work.

Looking Ahead, is the title of a small, four-page pamphlet on business prospects, prepared and issued by Mr. Alvan T. Simonds, president of the Simonds Saw and Steel Co., of Fitchburg, Mass. Mr. Simonds points out that there appears little doubt that 1928 will be a year of business revival. There will be the usual spring rise, then in the summer business may reach a lower point than the lowest point in 1927, from which business will again turn upward to its next peak. It is estimated the next peak will come in 1929, but the extreme high point may not appear until about 1930.

NEWS AND NOTES

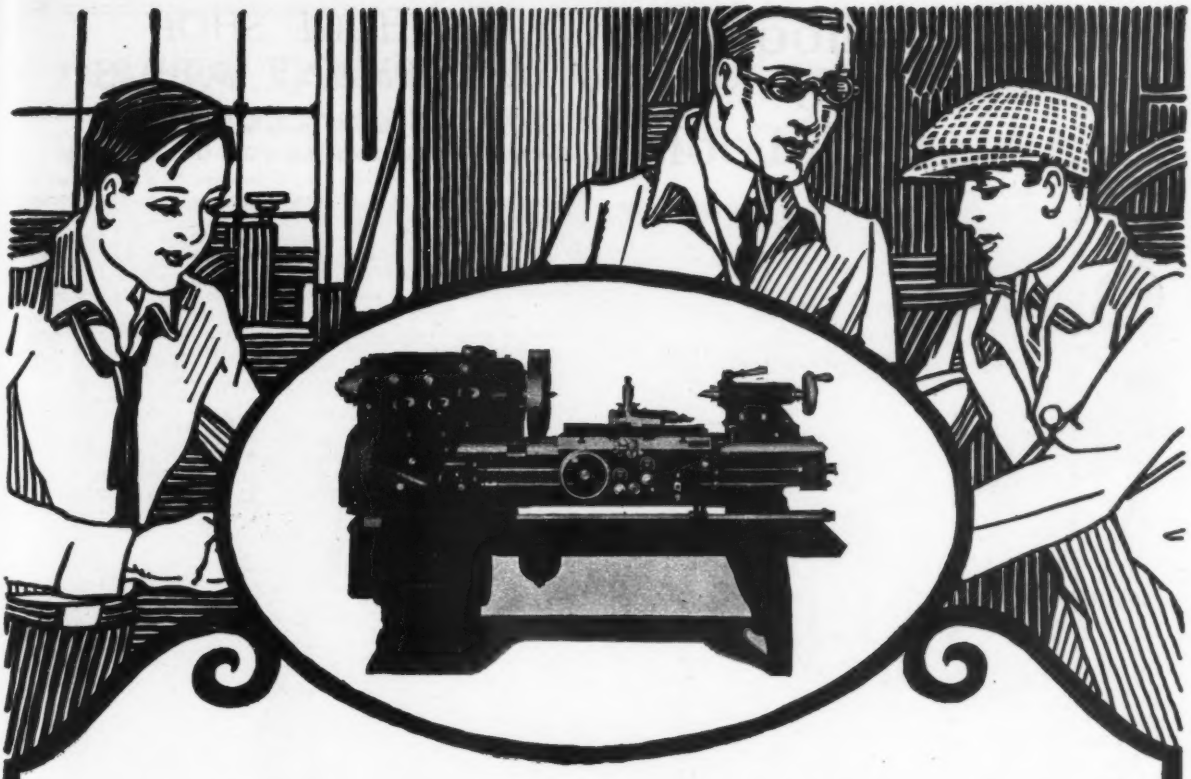
Examination for Junior Home-Economics Specialist. The U. S. Civil Service Commission at Washington, D. C., has announced an examination to be held April 14 for a junior home-economics specialist. The examination is to fill vacancies in the bureau of home economics of the U. S. Department of Agriculture. An entrance salary of $1,860 per year will be paid.

Information concerning the examination may be had from the Civil Service Commission at Washington, or from the secretary of the board of examiners, or any post office in any city of the country.

Examination for Assistant Home-Economics Specialist in Textiles and Clothing. The U. S. Civil Service Commission will hold an examination on April 3 to obtain an assistant home-economics specialist in textiles and clothing. The examination is to fill vacancies in the bureau of home economics of the Department of Agriculture, for duty in Washington or in the field. An entrance salary of $2,400 a year will be paid.

Information concerning the examination may be obtained from the U. S. Civil Service Commission at Washington, D. C., or the secretary of the board of examiners, or from any post office in any city.

(Continued on Page 34a)



Train Your Students for Their Jobs — Use MONARCH LATHES

Train your students on MONARCH LATHES and when they go from your school they will be ready for their jobs —valuable men immediately without the necessity of going through another period of training in the shop.

The student that is trained on a Monarch Lathe is trained in actual shop practice — for the Monarch is the first choice of Industrial America. Today more Monarch Lathes are being sold to industrial plants than any other lathe built.

The Monarch motor-driven, helical geared Lathe is the ideal equipment for instructional purposes. It is far in advance of other lathes in design. It is as near danger-proof as any lathe can be made. It is as noiseless as any lathe can be—an important advantage in the instruction room.

Monarch Lathes are used in the Massachusetts Institute of Technology, Yale, Cornell, and in hundreds of the best technical and high schools — proof that the Monarch is the practical lathe for modern school equipment.

The success of your school and the success of your students are inseparably linked together. Use MONARCH LATHES and meet the modern demand for training that *fits men for their jobs.*

Illustration above shows 14 x 6 helical geared Monarch Lathe

THE MONARCH MACHINE TOOL CO.

100 OAK STREET - - - - - - - SIDNEY, OHIO

Good Schools deserve "YANKEE" Tools

This man drove the blade of "Yankee" No. 90 Plain Screw-driver right through a four-inch plank—without splitting the handle.

He used a heavy mallet on No. 90 but that didn't matter.

You can't loosen a "YANKEE" HANDLE

No job can make the blade of a "Yankee" Plain Screw-driver turn or loosen in the handle. "Yankee" ingenious construction (found in no other screw-driver) makes blade and handle practically a one-piece tool.

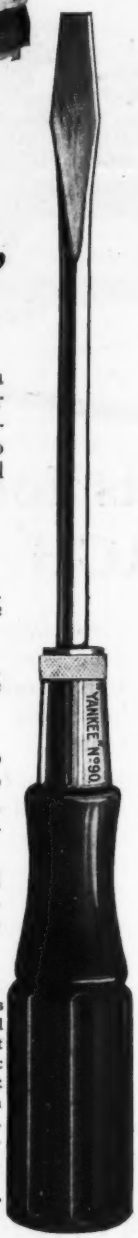
"YANKEE" Plain Screw Drivers

No. 90—Standard Style, 15 sizes, 1½ to 30-in. blades. Price 30c to $2.75.

No. 95—Cabinet Style, 11 sizes, 2½ to 15½-in. blades. Price 30c to $1.00.

"Yankee" Drivers are made to work with. Handles are shaped to fit the hand and give a firm grip. The blade steel is hardened and tempered exactly right.

Every individual blade is tested twice before leaving factory — another reason why a "Yankee" Driver lasts.



Write for Free "Yankee" Tool Book

Shows how "Yankee" Tools make work easier: Spiral Screw-drivers. Ratchet Screw-drivers. Automatic Push Drills. Ratchet Breast and Hand Drills. Plain Breast and Hand Drills. Ratchet Bit Braces. Automatic Feed Bench Drills. Ratchet Tap Wrenches. Vises with removable base, etc.

NORTH BROS. MFG. CO., Philadelphia, U.S.A

"YANKEE" TOOLS

Make Better Mechanics

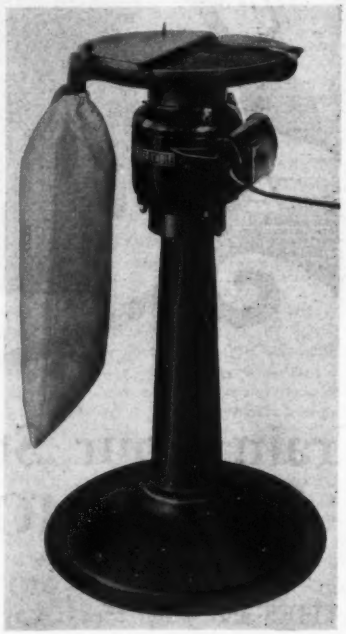
SCHOOL SHOP EQUIPMENT NEWS

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

SYRACUSE DISC GRINDER, TYPE D-3 IMPROVED

The Porter-Cable Machine Co., of Syracuse, N. Y., has issued a descriptive circular showing the latest improvements on the Syracuse horizontal disc grinder, Type D-3.

This machine is the only motor-driven horizontal disc grinder of its size and will be found useful to shop instructors for removing burrs from small parts after milling, pressing, stamping, and screw-machine operations. It saves hours of hand filing and secures a flatter surface. The machine has the advantages of dust elimination, removal of danger from breaking wheels, increased production through proper arm support, and safety through the inclosure of the disc edge.



The machine is not limited to use in the metal-working shop but is equally valuable in woodshops where such small articles as toys, blocks, models, and patterns must be smoothed after sawing. The machine may be moved to any part of the shop, which results in greater convenience for the operator who can change it about to meet his own requirements.

Shop instructors in metal or woodworking departments who are interested may obtain further information by writing to the Porter-Cable Machine Co., at Syracuse, N. Y.

KNO-WOOD SAMPLE KITS

Many instructors in school shops and in the general-science departments have been confronted with the problem of having suitable samples of various kinds of wood handy for their class demonstrations.

The John Schroeder Lumber Company of Milwaukee, Wis., has recognized this need, and has prepared a sample kit known as "Kno-Wood Kit," which contains 24 kinds of the commercial woods that may be used for both shop and general-science instructors. Because only a few shops are able to carry a large assortment of different kinds of lumber, this set of 24 species should be of help to those interested in teaching the pupils the various kinds of popular woods.

The sample kit is neatly packed in a box, and each piece is marked so that the pupils may easily and quickly differentiate the various kinds of lumber after having studied the samples.

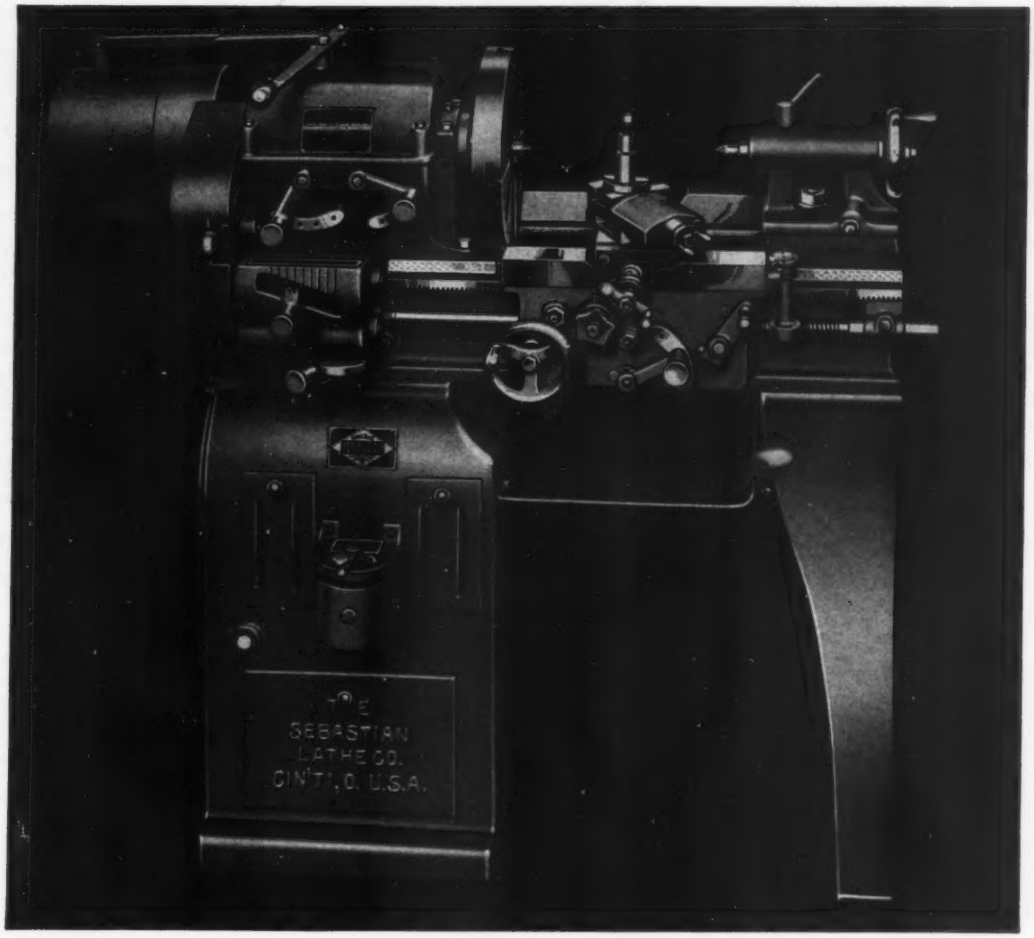
NEW NORWICH BALL-PEEN HAMMER

The David Maydole Hammer Company of Norwich, N. Y., has announced a new line of Norwich ball-peen hammers, which will be sold at a popular price and whose material and workmanship will be backed by Maydole's universal reputation. This hammer is offered for sale to the casual hammer purchaser to which price is an important consideration. It is manufactured from high-grade open-hearth tool steel according to a special formula, and is the best imitation of the genuine Maydole hammer.

Information concerning the Norwich hammer may be obtained by writing to the David Maydole Hammer Company at Norwich, N. Y.

THE NEW 11-inch GOLD SEAL HEAVY DUTY LATHE

Reduces Breakage and Wear to a Minimum
Is as Precise as the Finest Tool Room Lathe



3-4-5-6 Foot Bed Lengths

During recent demonstrations to school officials this new lathe was submitted to amazing overload and break down tests. It demonstrated beyond a doubt that a lathe particularly suited to school shop requirements is now available.

DETACH AND MAIL COUPON IN ORDER
TO ACQUAINT YOURSELF WITH COMPLETE DETAILS
OF THIS NEW LATHE.

The Sebastian Lathe Company
Cincinnati, Ohio

Coupon
The Sebastian Lathe Co.,
Cincinnati, Ohio.
Send descriptive Bulletin of your New 11-inch Lathe.

Name.....
Position.....
St. & No.....
City..... State.....
IAM-4

start him *with the* right tools

Selection of proper tools for manual training pupils is just as important as the selection of proper text books.

Genuine Irwin Auger Bits have earned the right to your confidence. They have proved to thousands that they cut cleaner, truer, faster, and last longer. Their unvarying uniformity is of extreme importance. The next one will be just as good as the last.

There is a special 13 Bit set for Manual Training use. It includes a full range of sizes, each cutting head designed and timed for best results under Manual Training School use. Write for information on this set.

We will also be glad to send our book "How to Select, Use, and Care For Bits."

Most all good hardware dealers handle Irwin Auger Bits.

THE IRWIN AUGER BIT CO.
Wilmington, Ohio.

IRWIN *Auger Bits*

(Continued from Page 30a)

ART PILGRIMAGE THROUGH EUROPE

Announcement has been made of an art pilgrimage to Europe, offering ten weeks of travel on the continent, under the direction of Dr. Henry Turner Bailey of the Cleveland School of Art.

A choice of three tours has been arranged to be conducted during the summer in connection with the International Art Congress to be held at Prague, Czechoslovakia. Main tour A, starts June 29 and costs $780. Tour B, starts August 6 and costs $845. Tour C, starts August 6 and costs $950. Tour A, will be in charge of Dr. Bailey; Tour B, in charge of Prof. A. B. Clark and Mr. O. F. Ege, and Tour C, in charge of Mr. V. L. George.

Mr. Elmer W. Christy and Mr. Raymond T. Fell, of Cincinnati, Ohio, have been appointed as directors and solicitors for the Western Arts territory with the purpose of creating interest on the part of art teachers in the worth-whileness of the old-world tours.

Information concerning the tours may be obtained by writing to Mr. Christy, or Mr. Fell, at 3613 Wilshire Ave., Cincinnati, Ohio.

NEW RULES FOR THE CERTIFICATION OF ART TEACHERS IN CONNECTICUT

The state commissioner of education of Connecticut has announced a revision of the rules governing the certification of art teachers, which becomes effective July 1. Under the rules, a certificate to teach art or drawing will be given to any applicant who complies with the following conditions:

1. The teacher must give evidence of graduation from an approved four-year high school, or its equivalent.
2. The teacher must have completed at least one year of a teacher-training course in an approved art school, including a course in education aggregating two semester hours, on and after July 1, 1928. After July 1, 1930, such teachers must have completed two years of a teacher-training course in an art school, including courses in education aggregating four semester hours.
3. In addition to the above, such teachers must pass an examination consisting of a technical test in representative drawing, design and color, and construction; also a written test in art appreciation, history of art, and theory and practice of teaching art.

Exemption from the requirements of the last two provisions will be given in the case of graduation from an approved four-year teachers' college or normal school offering a course in art training of at least two years; graduation from an approved two-year normal school, and completion of a two-year teacher-training course in an art school; or, completion of a three-year teacher-training course in an art school.

THE LOS ANGELES MODEL AIRPLANE TOURNAMENT

A model airplane contest will be conducted on March 24, at Los Angeles, Calif., under the direction of the manual-training department of the city schools. The tournament is being sponsored by the Los Angeles junior chamber of commerce and the Los Angeles *Evening Express*. All elementary-, junior-, and senior-high-school students are eligible to participate in the tournament.

In connection with the contest, the following events have been scheduled:

1. A glider contest for distance.
2. A glider contest for duration of flight.
3. A spine-fuselage-model contest for distance.
4. A commercial-model contest for distance.
5. A scale-model contest (small replicas of large planes which teach plane design).

Under the rules of the contest, each contestant in the contest for distance will have three official flights, and will be credited with the greatest distance made in any one of the three flights.

In the contest for duration, each contestant will be allowed three flights, and will be credited with the greatest elapse of time made in any one of the flights.

Each contestant may enter two flying events and may be allowed a maximum of three models. He may use any or all to complete his three official flights. Each contestant must be the owner and builder of the model submitted, with the exception of the metal fittings.

In the contest for scale models, awards will be made on the basis of workmanship, trueness to type of large planes, and fidelity to scale.

Distinction of Master Teacher Conferred Upon North Carolina Agricultural Instructor. The distinction "master teacher" for the Southern states has been conferred upon Mr. A. H. Veazy of Rosewood, N. C., in recognition of the thorough and comprehensive agricultural-teaching program he has carried out in the Rosewood community. For the past five years, Mr. Veazy has had charge of the department of vocational agriculture in the Rosewood high school. Among the activities which Mr. Veazy carried out in the 1926-27 program of work were the establishment of classes in agriculture for 91 persons in the community; the conduct of high-school agricultural classes, and evening classes in cotton, corn, tobacco, swine and poultry; the organization and supervision of a community fair, a community club, a bull association, the buying of fertilizer, and selling of hogs and poultry; a survey of 155 farms to learn the actual community problems; and the inauguration of classes in better methods of breeding and feeding hogs.

(Continued on Page 37a)

(Continued from Page 34a)

BUILDING MODEL AIRPLANES AT ATLANTA, GA.

The establishment of a six-period day in the junior high schools of Atlanta, Ga., during the past year was responsible for the elimination of the extracurricular period in these schools. In some of the schools, the teachers had such well-organized clubs that they continued them after school hours. The clubs met for an hour once or twice each week and devoted the time to regular club activities.

At the O'Keefe Junior High School, the instructor, Mr. T. P. Fiske, organized an airplane club as a part of the work in crafts. The club began with an initial enrollment of twenty boys and the work was started with the building of models shown in "The American Boy." Meetings at first were held twice each week for an hour, but with increasing interest, it became necessary to keep the shop open an hour each afternoon and on Saturdays.

At present the club has a membership of forty boys and there are applications for membership each day. The club is governed by a constitution modeled after the Airplane model league of America, and officers are elected by the members. Dues of 25 cents per month are collected from each member to cover the cost of material for building the airplanes.

Recently, the demand for large models has become so insistent that it was decided to abandon the making of the small models and to devote more attention to the making of large models of planes like "The Spirit of St. Louis."

Plans are being completed for an airplane contest to be conducted before the close of the school year. In the contest all types of planes will be included as a means of creating added interest in the project.

An Exhibit of American Educational Methods. An exhibit portraying American methods of education will be shown at the Ibero-American Exposition, which will open October 12 and continue through June, 1929. The exposition will embrace Spain, Portugal, and the republics of North and South America, and will be held in Seville.

The American exhibit will cover the fields of city and rural kindergarten, primary, intermediate, and high schools. There will also be shown a series of educational motion-picture films in the theater which the United States will erect. The American exhibit will be housed in three buildings, for which an appropriation of $700,000 has been made by Congress.

Boys Who Drop Out of School Taught Farming in Wisconsin. Dr. C. H. Lane, chief of the agricultural-education service of the Federal Board for Vocational Educatiop, has reported that part-time classes for 40,000 farm boys who have dropped out of school have been started as a part of the agricultural-education program in the state of Wisconsin.

The part-time courses for farm boys are arranged according to the particular needs of the groups in attendance and differ from the traditional high-school courses in their elasticity as to length and content. The estimated net income from projects carried on in these part-time classes, according to Dr. Lane, amounted to $19,860 in 1926.

The classes are conducted in the winter or dull season of the year for the special purpose of meeting the needs of these boys who have dropped out of the regular school. They are conductd for periods of from two weeks to three months, according to local needs. The boys go to school from four to eight hours a day, and devote the extra time to work which promotes their ability as farmers and citizens.

In 1926, in spite of bad weather conditions and bad roads, the number of part-time schools for farm boys increased from 34 to 47. There were 663 boys enrolled in these part-time schools, or an increase of 86 per cent over the previous year.

Wisconsin is taking full advantage of the opportunity for farmers in evening schools by holding 29 evening schools last year as against 22 for the previous year. The enrollment included 579, as against 381 for the previous year.

Will Award Prizes for Proficiency in Sewing. The public schools of New York City, through Mrs. William Morganthau, were given a donation last year of $1,000 for money prizes, to be given to pupils in each 8B class showing the greatest improvement and proficiency in sewing. This year it was decided not to give money prizes, but to award a gold pin to each girl eligible to a prize for her sewing.

Announce Soap-Sculpture Competition. The National Small Sculpture Committee of New York City has announced a national soap-sculpture competition for 1928. The contest which closes on May 1, is the fourth annual contest for prizes offered by the Procter & Gamble Company for sculpture in which soap is used as the medium. In the contest, three prizes of $300, $200, and $100 are offered for the three best pieces of sculpture in soap.

It is planned to hold an exhibit of the collection of prize-winning and other designs during the month of June, at the Anderson Galleries in New York. At the close of the exhibit, the sculptures will be sent on a tour of the museums, art schools, and other art centers of the country.

(Continued on Page 38a)

A Goal *for the* Boys *to* Work *for*

Naturally, a boy learns to saw in a cheap, soft wood. He learns quicker and it costs less.

But the more proficient that boy becomes in craftsmanship, the more he deserves better woods with which to express his mounting skill.

Give the better craftsmen in your classes American Walnut to work with. Let everyone know that this is a reward for good workmanship—and you'll have keener rivalry, faster progress, more eager workmen.

Boys know the superiorities of walnut once they have worked with it. They know how proof against cracks and splits it is, how beautifully it finishes, how much distinction it gives to their work. They appreciate the opportunity to do their best in a wood that deserves their best.

Our literature on American Walnut will give you some interesting information as to the physical characteristics of woods, the high points in the history of cabinet making, and the advantages of American Walnut. The coupon is for your convenience.

American Walnut Manufacturers Association
Room 3406, 616 South Michigan Avenue
Chicago, Illinois

Please send me your brochures on American Walnut.

Name ----------

Address ----------

AMERICAN WALNUT

Drawing Tables

—for Any School
—for Any Size Class
—for Any Number of Students

For 8 Students
No. 205

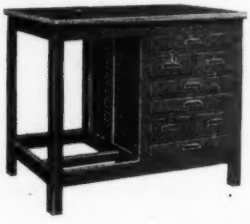
Provides individual accommodations for 8 students. Four compartments open to the front and four to the rear, holding drawing boards and other equipment. This desk takes care of the greatest possible number of students in the same room.

For 6 Students
No. 220

One of our best sellers—very roomy and comfortable, with an adjustable top. Very popular for high schools — 6 compartments for 6 students—each containing drawing board, T square, triangles, paper, and instruments.

For 4 Students
No. 240

A good type of Drawing Table for Universities. Provides accommodations for four students, each with individual drawing board compartment and individual drawer for instruments, both locked with same padlock.



The old order is passing—modern schools are becoming equipped with attractive and highly efficient Kewaunee Drawing Tables.

The Kewaunee line comprises Tables designed for two to eight students — all designed for the greatest compactness, comfort, and convenience. They are firmly constructed to insure rigidity for long service under rough student usage. Finished in Light Golden Oak—the standard Kewaunee finish—or we match any special finish desired.

We are manufacturers of a very complete line of Art and Mechanical Drawing Tables. Write for our complete Book of Illustrations.

Kewaunee Mfg. Co.
LABORATORY FURNITURE EXPERTS

Designers and Manufacturers of Art and Mechanical Drawing Room Furniture for Schools and Colleges

Kewaunee-Economy Plant No. 2
ADRIAN, MICH.

(Continued from Page 37a)

HOLD INTERESTING KITE TOURNAMENT AT SAN DIEGO, CALIFORNIA

A kite tournament was held at San Diego, Calif., in which boys and girls of 7 to 15 years participated. Preliminary tryouts had been conducted on the various playgrounds during the preceding week and the fifty winning kites at the preliminaries were selected for participation in the final grand tournament.

For several weeks preceding the tournament, the handcraft classes of the municipal playgrounds has specialized in kitemaking. There were flat kites and box kites; Chinese bird kites and Philippine fighting kites; round, star, and diamond-shaped kites; kites with and without tails; kites flown in tandem formation, and kites in grotesque forms and bizarre colors.

Kites were entered either as exhibition kites, or as contest kites. The exhibition kites were of four kinds, while the contest kites were of six different kinds. Boys and girls were permitted to enter kites they had made on the playgrounds or at home, but no kite over 5 ft. high was admitted.

The elevation contest consisted of seeing which kite would attain the greatest height at the end of a five-minute flying period. The elevation was judged by the angle the different kitestrings made with the ground.

The message race consisted of placing paper messages on the kitestrings and seeing which message reached the kite first.

The kite battle consisted of an elimination contest in which the kites were matched in pairs. One kite from each of the city playgrounds was admitted. Kites and strings near the kites were armored with metal and with knife and razor blades for the purpose of cutting down the opposing kite.

The kite flying race was designed to see which contestant could send his kite into the air and reel it first. The contest resolved itself into speed in raising the kite and reeling it in without allowing it to fall.

The tug-of-war was an elimination contest with the kites matched in pairs. The ground ends of the contesting kites were passed through two small swivels, which were held by the judges about twenty feet apart to keep the kites from being crossed or tangled. The kite with the most string out at the end of five minutes was adjudged the winner.

The jazz contest was to determine which kite could pitch most rapidly, widely, and daringly during a five-minute period. This was a test of skill and daring of manipulation.

The tournament was conducted with the aid of score cards and sheets, and governing officials, similar to regular track and field meets. Points were awarded winning kites for first, second, and third places. The kite which scored the most points was the sweepstake winner, and the combined score of the kites entered from each playground determined the rating of the different playgrounds.

Chicago High Schools Take Up House Planning. The school authorities of Chicago have approved a "plan your home" program, worked out by Mr. A. G. Bauersfeld, director of technical work in the high schools, as a means of training the high-school boy in the reading and preparation of architects' plans.

Interest in architecture will be stimulated through a city-wide competition in house planning, in which the architectural classes in each high school will take part. Plans produced in the schools will be displayed and prizes awarded in the various classes. Designs of the class winners will be exhibited later in the downtown offices of the board of education and final prizes awarded during the first week in April.

The drawings will include exhibits in four classes, as follows:

1. A complete set of drawings of a six-room house to be prepared by senior students in architectural drawing.
2. A complete set of drawings of a five-room bungalow by junior students.
3. Drawings of building details by sophomore and freshman students.
4. Drawings on the rendering of classical architectural orders by junior students.

The idea of planning a house and working out the details has created a good deal of interest in the schools because it is a project that stirs the imagination of young draftsmen to attempt something worth while. The project has drawn the interest of the homes of the pupils and the parents have been drawn into the discussions.

The members of the American Institute of Architects have cooperated in working out the details, and a number of prominent architects will serve as judges in making the awards for first, second, and third places in each of the four classes of the contest.

Vocational Pupils Awarded Prizes for Projects. The pupils of the vocational school at Brooklyn, Pa., have been awarded five prizes in the recent state-wide project contest. Glenn Griswold won the first prize, a gold medal, for beekeeping. Elbert Meade won a silver medal for a fruit-growing project.

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Install New Machine at Spring Valley. A mortising machine has been added to the equipment of the carpentry shop of the Hall Township Vocational School, Spring Valley, Ill.

NEWER METHODS TO SERVE INDUSTRIAL-ARTS INSTRUCTION

Mr. Clyde A. Bowman of Stout Institute, Menomonie, Wis., speaking before the American Vocational Association at Los Angeles recently, discussed the topic, "Newer Methods in Education Which Can Be Made To Serve Industrial-Arts Instruction." Mr. Bowman pointed out that in the development of the six-three-three plan, it has been necessary to develop scientific procedures, both in administrative management and instructional method. He showed that some of the new methods in education are part of and result from such innovations as survey tests, diagnostic tests, survey courses, guide sheets, and lesson sheets based on the contract system. The general shop, he pointed out, has placed pressure on the development of instructional material in a form to be placed in the hands of the students.

Commenting on the use of the contract system as applied to instruction in the industrial-arts classes, Mr. Bowman related the experience of the Stout school officials with the contract idea in shop classes, academic classes, science classes, clothing classes, and cooking classes. He endeavored to select those elements or phases of the contract system which are most clearly in evidence in connection with its use in industrial-arts instruction. He also suggested the uses which these elements may have for the industrial teacher in modifying the content and instructional methods of the industrial courses according to the six-three-three plan.

Speaking on pupil performance, Mr. Bowman said that pupil performance in a subject, resulting in the acquisition of knowledge and skills, is at its best when it is the result of challenge. Challenge should grow out of a group discussion. Even after pupils have been trained in individual instruction, it is necessary to have an exchange of opinions.

Freedom in education for the pupil implies, according to Mr. Bowman, freedom in the choice of a method and in the choice of a subject matter both in kind, type, and quantity.

In the determination of minimums for pupils, it is necessary to take into account the number, kinds, and types of basic elements, the basic processes available through an instructional device for pupils, information sheets for covering the minimums required, the relation between the instructional device and the performance to be participated in by the pupil. The minimums should be stated in definite and specific goals, and each unit of work must be extensive enough to demand thoughtful planning of time and work, sustained interest, and responsibility.

The pupil should secure acceptable results in the minimums in order to secure a passing rating; he may secure higher ratings than just passing through new combinations of basic processes, investigation, and acquisition of new related information, amplification of design, speed in performance, and investigation and acquisition of knowledge in new orientation of things acquired by the pupil.

Mr. Bowman concludes by saying there should be an objective method of determining acceptable results in the minimums. Complete diagnostic tests are desirable. The tests are necessary as elements of evaluation.

Organize Missouri Vocational Association. The Missouri Vocational Association was organized November 11, at St. Louis, Mo., at a dinner meeting held in the Jefferson Hotel. A total of 140 persons were present at the initial meeting to answer the call to order of Mr. G. W. Reavis, the acting chairman of the association.

At the business session, a constitution was adopted and dues set for the year. Mr. G. W. Reavis was elected as president; Miss Alma Fletcher, St. Louis; Mr. Robert Runge, Springfield; Miss Esther Morris, Greenfield; Mr. L. G. Dake, St. Louis, and Mr. F. C. Wilkins, Rolla, were elected vice-presidents; and Mr. C. L. Wetzel secretary-treasurer.

The association appointed nine delegates to attend the American Vocational Association meeting.

The Association has a charter membership of 143 at the present time.

Observe Twenty-second Anniversary of Atkins Pioneers. The twenty-second anniversary of the Atkins Pioneers, a twenty-year club of the E. C. Atkins Company of Indianapolis, Ind., was observed with a banquet at the Hotel Severin on January 14. The dinner was given by the officials of the Atkins Company. Talks were given by President E. C. Atkins, Mr. W. A. Atkins, general factory director, and Mr. W. J. Strack, president of the Pioneers.

The club was organized in 1906 with 62 members who had served the company for twenty years or more. This year there were 43 active charter members, or a total of 228 members. Mr. Charles Fenton, the second oldest pioneer in service, is completing his fifty-fifth year of service and was granted a distinguished service pin at the anniversary banquet.

The officers of the club are as follows:

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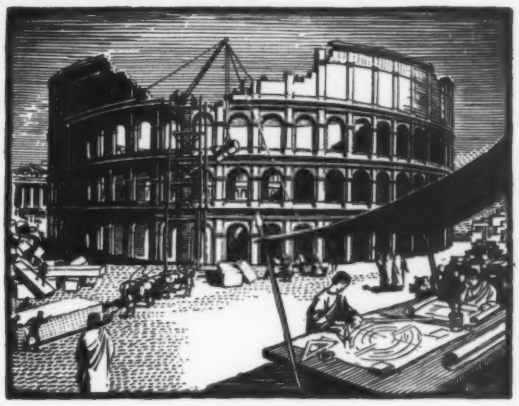

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(Continued from Page 41a)

President, Mr. W. J. Strack; honorary president, Mr. H. C. Atkins; vice-president, Mr. Raymond Mock; honorary treasurer, Mr. C. F. Aumann; treasurer, Mr. James Wilde; secretary, Mr. C. A. Newport; assistant secretary, Mr. W. A. Weaver.

Training in Service for Industrial-Arts Teachers. Mr. O. H. Day, of Kansas City, Mo., speaking on the topic, "Upgrading Industrial-Arts Teachers in Service," before the American Vocational Association at Los Angeles, Calif., pointed out that upgrading of teachers is a process of growth and that there must be sources of stimulus to greater improvement, with numerous aides for meeting the needs of teachers in regular service. Mr. Day's paper took up four different means of approach to the problem of training in service as follows: (1) Classification of teachers in service; (2) Sources of stimulus; (3) Meeting the needs of teachers, and (4) The establishment of aids that will challenge the teacher to improvement. Among the latter, Mr. Day lists the instilling of a progressive professional spirit, supervision that challenges the teacher to improvement, university extension courses that really stimulate advancement, attendance at summer schools where the course fits the teacher for advancement, the establishment of teachers' meetings and institutes where the teacher may be instructed, and not merely checked up.

Achievements in Vocational Home-Economics Departments in Nevada. Indications of the success of home-economics training in Nevada are to be found in the achievement reports from the various high-school departments in the state. At Battle Mountain a novel idea in a food-unit plan was tried out with much success. The department advertised that meals would be served to family-size groups at a trifle above the cost of materials. A number of reservations were made.

The girls worked in pairs in arranging for the meals. Each pair selected a group and planned and served the meal for them. One meal was served each week, while the other days of the week were used to study foods, food selection, buying, cooking, and serving, finding new recipes, and writing reports of the work.

In Lincoln county, the high-school girls made white bungalow aprons and caps for use in the food laboratory. A fashion show was held to celebrate the completion of the project.

The making of inexpensive, attractive, and useful Christmas gifts was worked out by the class at Winnemucca. Pretty wall hangings, lamp shades, wastebaskets, handkerchiefs, and pillows were made. This was the first work attempted by these students and they displayed considerable initiative in selecting, making, and arranging the designs.

The Smith Valley class prepared and served one-dish hot lunches for the junior and senior high-school students. The lunches gave the girls considerable experience in planning and cooking for larger numbers. The students to whom the meals were served were benefited in health as a result of the meals.

At Tonopah, the class redecorated the home-economics house. In the work every phase of the project was covered, which resulted in the completion of a practical project in home furnishing.

The Sparks home-economics class participated in a family and community unit of work. The conference method was used to develop the unit and a skeleton outline was prepared. During the course of the unit, the girls chose varied home projects, which were summed up in one objective: To improve the attitude toward the members of the family in order to make the family life happier.

At Yerington, a health contest was conducted by the freshman and sophomore classes, which proved beneficial in establishing health habits not formerly practiced.

The Moapa Valley class in home economics served a hot dish daily during the winter months to the grade and high-school students. Many of the students come from outlying districts on the school bus and the school day is quite long for the small children. On the first Thursday of each month, a luncheon is served to the members of the Moapa Valley Commercial Club. This gives the girls practical experience in luncheon planning, preparation, and service. The home projects consist of cooking, sewing, health work, home improvement, good habits, and family and community relationship.

Shenandoah School Wins in Sander Contest. A contest is conducted each year in Dade county, Florida, in which the school shops of the county contest for a prize in the shape of some tool of use in the shop. The prize is given to the school shop having the best record during the first semester on 24 main items.

This year the prize was a take-about sander donated by the Porter-Cable Company of Syracuse, and seven schools participated in the contest. The Shenandoah School won first place and the R. E. Lee School second place, with the Andrew Jackson School receiving an honorable mention.

Last year a similar contest was held, at which time a band saw was given to the Miami Beach School, which won on that occasion.

The contest has been found a very effective means of creating interest in the shopwork and of improving the efficiency of the instruction. Both the students and the instructors have found the contest an enjoyable project and one that increases the interest in shop processes.

(Continued on Page 44a)

They make posters and lettering more of a pleasure

THUS says A. K. Oakley of Charlevoix, Michigan, after trying out "Prang" Tempera Colors. And he adds - "The smoothness with which the colors may be laid and the brilliancy of the finished work is remarkable".

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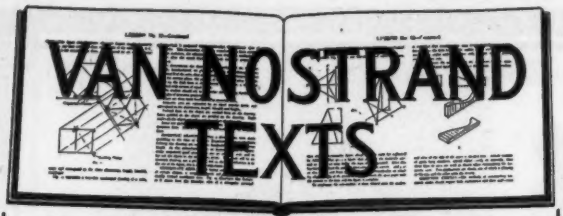

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(Continued from Page 42a)

Electric Shop Constructs Display Sign. The electric shop of the Boys' Technical High School, Milwaukee, recently completed a large electric sign which has been placed in the gymnasium of the school. The sign was planned by Earl Krainik and Chester Laabs, and was constructed by Edward Rohde and Virgel Lamfe of the electric shop. The lettering is illuminated in white lights and the border alternately in blue and white.

BUREAU OF STANDARDS UNDERTAKES STUDY OF WATCHMAKERS

The United States Bureau of Standards has recently completed a detailed study of nearly 1,000 watchmakers who had applied for examination at the Horological Institute of America. The survey is a fair cross section of the watchmakers' trade as it exists today and includes a study of workers ranging from 16 to 73 years of age, with an average of about 35 years.

According to the study, watchmakers may be divided into three main groups: (1) Those in business for themselves; (2) those working for others, and (3) those attending horological schools. The last group is fairly numerous in the ages below 35, but by far the largest number are employed by others. Those working for themselves comprise about one sixth of the total number.

Of the 786 who have already been granted junior watchmakers' certificates, 373 have applied for the higher grade examination, and 301 have completed this grade. On the average, it is found that four to five months are required for the completion of the junior examination and five to six months for the certified examination.

On the whole, the results of the survey show that a large majority of the men are capable of performing good work. A few dropped out through failure to pass the examination, while others have tried again and have succeeded in passing on the second trial.

Prizes Awarded in Union Pacific Contest. Vernon Mills, a senior student in the high school at Moapa Valley, Nev., recently won first place in the Union Pacific contest and was awarded the first prize of $50 for the best project work in vocational agriculture. Orville Perkins, of the same school, was awarded second place. The contest is conducted each year by the Union Pacific Railroad as a means of encouraging and stimulating interest in agriculture and agricultural education.

During the last year there were 26 boys enrolled in vocational agriculture in Clark county. The total receipts from projects amounted to $4,731. The average return for each boy enrolled was $101.33.

Wisconsin Manual-Arts Teachers Hold Meeting. The manual-arts section of the Southern Wisconsin Teachers' Association held a luncheon meeting on February 10, at Madison, with Mr. E. W. Thrall as chairman. At the meeting, Mr. William McAndrew of Chicago, talked on the subject, "Teaching Like a Man"; Mr. Hans Schmidt of Madison, talked on "Aims and Needs of Manual-Arts Work in Wisconsin"; and Mr. J. F. Friese of the State University, discussed the relations existing between the state teachers' colleges and the university. About 45 teachers were present, which was the largest gathering the section had held.

A New Project in Soap-Block Printing. The educational department of the Procter & Gamble Company, Cincinnati, Ohio, is sponsoring a movement for encouraging a new project in soap-block printing. The work consists of cutting designs on blocks of soap of varying sizes, similar to the method used by artists in cutting wood blocks.

In making the designs, a tracing is first made on transparent paper. This is placed on the soap-block surface with the tracing face down. The lines are traced with a sharp pencil or pointed tool, the paper is then removed, and the lines cut deeper. For coloring, artists' tubes of oil paints are found most satisfactory. These are applied with a brush to the block which is placed face down on the paper or cloth on which it is to be printed, and pressed firmly. Where several colors are desired, they may be painted on the block and printed at the same time.

Designs and complete instructions for block printing with soap may be obtained by writing to the educational department of the Procter & Gamble Company at Cincinnati, Ohio.

Vocational Training for Children with Heart Affections. An experiment in vocational training of boys and girls with heart affections, carried on for several years in special classes of two trade schools in New York City has been so successful as to indicate its practicability and value. Of 115 girls discharged during the first two and a half years of the classes, the majority of those who completed the course have been found to be at work at the trade they have learned, and are earning higher wages with shorter periods of unemployment than those who entered occupations unrelated to their trade training.

Under the plan, only those children are admitted to the classes who have been passed as able to carry on in the industry, and who have met the educational requirements for working papers. It has been found that this class of children are not in need of segregation in special classes, provided they are kept under medical supervision.